853
U56165
1979

United States. National Institutes of Health.
Division of Research Resources.
Report of program activities.

ANNUAL REPORT

FISCAL YEAR 1979

(October 1, 1978 - September 30, 1979)

DIVISION OF RESEARCH RESOURCES

National Institutes of Health
Bethesda, Maryland 20205

Library
National Institutes of Health
Bethesda, Maryland 20014

TABLE OF CONTENTS

Report of the Director.....1

Report of the Deputy Director.....7

Office of Science and Health Reports.....13

Office of Administrative Management.....23

Office of Grants and Contracts Management.....29

Animal Resources Program.....31

Biotechnology Resources Program.....51

General Clinical Research Centers Program.....73

Biomedical Research Support Program.....87

Minority Biomedical Support Program.....95

REPORT OF THE DIRECTOR

Dr. Thomas G. Bowery

Report of the Division Director

Early in fiscal year (FY) 1979, we embarked on a major effort to develop a Divisional Five-Year Program and Financial Plan, FY 1982-86. As FY 1979 draws to a close, the final results of the process thus set in motion are yet to be determined.

The Division's five Program Directors, their staff, and each of the advisory Initial Review Groups have been responding to a program planning concern set forth in the following charge:

Assumption

The DRR budget for the fiscal years 1980-86 will be constrained by a general "no growth policy" enunciated by the Administration and reinforced by the mood of the national electorate calling for reduced Federal spending. The Division's budget will suffer continued erosion due to inflationary pressures. In seeking an optimum balance between program stability and program initiatives among the five highly differentiated programs of the Division, budgetary trade-offs probably will be the basic budgetary processes used to seek such a balance.

Thesis

There are few if any precise objective measures to determine differences in the impact on the Nation's biomedical research effort between such disparate DRR Programs as--

- General Clinical Research Centers
- Biotechnology Resources
- Primate Research Centers
- Biomedical Research Support
  (formerly known as General Research Support)
- Minority Biomedical Support
- Laboratory Animal Sciences

Therefore, even in an era of fiscal constraints subjective measures continue to be important when dealing with the Division's program direction, budget formulation and execution. An increasingly important measure, however, is the skill that the Program and its advisors demonstrate in long range planning. Thus, Divisional funds will be allocated to those Programs that can best state their needs and opportunities in written plans indicating what scientific areas and priorities have been proposed to best use the scarce dollars.

Facts

The cost pressures within the General Clinical Research Centers Program has led to a phaseout of some five Centers over the past several years and other approved Centers may have to be phased out in the early 1980s.

The Biotechnology Resources Program has an approved unfunded backlog of approximately $2.5 million of high priority (135-212) national shared instrumentation resource applications in its portfolio and is in the process of phasing out several competing continuation resources with priority scores better than 200.

The Primate Research Centers have a decaying physical plant, one that was originally constructed through special Federal legislation (subsequently withdrawn) in the early 1960s. Thus, choices between program quality and required physical plant maintenance and replacement are becoming more critical each year.

The Minority Biomedical Support Program, the cornerstone in corporate NIH's extramural affirmative action program, is sustaining its momentum above its base appropriation only through a series of annually negotiated intra-agency transfer of funds from nine other Institutes of NIH. These of course are subject to downward negotiation based on the priorities of the other Institutes.

The Biomedical Research Support Program appropriation is currently running at a level some 12 to 13 percent below its legally authorized level of funding.

The Laboratory Animal Sciences (LAS) Program continues to have demand pressures on it by evolving regulations and public pressure regarding the care and use of animals used in research.

Modus operandi

A set of general questions as well as those that are program specific of a long range planning nature were developed. Such questions and their answers stimulated discussion and response and required elucidation from the DRR Program Directors of their thinking and that of the Division's advisory apparatus. This has lead to the identification in writing the key scientific and administrative needs, opportunities and issues facing each Program in the mid-1980s. The Program Directors are expected to develop from this written plan, addressing the prioritization of these issues, the proposed allocation of limited resources. Thus, how seriously and how well each Program articulates its program direction, goals, priorities, trade-offs, and resource allocations will critically affect Divisional budgetary recommendation to the Director, NIH.

The material received from the five highly differentiated Programs of the Division will undergo analysis and synthesis into a more integrated Divisional Five-Year Plan during the final months of FY 1979. This will be

subject to final review by the National Advisory Research Resources Council in late October 1979 and an operational review by the Director, NIH, early in FY 1980.

It is our current intention to make the Plan available to the extramural community we serve with an invitation for comments.

This final element of the Division's planning process will set the stage for future refinement of the DRR Five-Year Plan.

REPORT OF THE DEPUTY DIRECTOR

Dr. James F. O'Donnell

Report of the Deputy Director

During Fiscal Year 1979 all vacancies on the National Advisory Research Resources Council were filled in a timely manner and all of the Council Program Work Groups became functional at the May meeting. We had made advanced plans to hold the May meeting in Atlanta where the Council would have the opportunity to visit a large MBS Grantee Institution, a Primate Center, a General Clinical Research Center, and several Biomedical Research Support Grant Institutions. This would have afforded both Council and staff members with an opportunity to become acquainted with resources funded by the Division with which they had minimal on-site familiarization. Due to restrictions on staff travel, however, it was not possible to carry out these plans. We hope to reschedule this activity during the coming Fiscal Year.

The merger proposed two years ago of the Animal Resources Advisory Committee with the Primate Research Center Advisory Committee into a single Committee, the Animal Resources Review Committee, was approved by the Department in May of this year. We were instructed, however, to reduce the full Committee membership from 23 to 20 by June 30, 1980. We are confident a membership of 20 will provide the Committee with sufficient expertise for adequate review of all assigned applications. The first meeting of the merged Committee was held on May 30, 1979, at which orientation for the full range of the Animal Resources Program activities was provided.

The first joint meeting of the two subcommittees making up the General Research Support Review Committee, the Minority Biomedical Support Subcommittee and the Biomedical Research Support Subcommittee, was held on June 28, 1979. This provided an opportunity for Program staff to explain the Minority Biomedical Support, Biomedical Research Support Grant and Biomedical Research Development Grant Program objectives and application review criteria to members who had previously participated in only one of the Program activities.

From discussions generated among members of the Division's Review System Group a policy statement was developed concerning the acceptance of food and refreshments by staff and consultants during staff or site visits. The policy, which was accepted and promulgated by the Director, DRR, states that:

> "In interpreting the HEW Standards of Conduct, /Subpart C, 'Gifts, Entertainment and Favors,' No. 73.735-301 and No. 73.735-305/, no DRR employee may accept food, entertainment or other gratuities from members of the public with whom the DRR employee has an official relationship, e.g., a grantee, an applicant or a potential applicant. Acceptance of light refreshments (e.g., coffee, soft drinks, donuts, etc.) is excluded from this definition.

"If required for the efficient conduct of a project site visit or staff visit, arrangements may be made for the institution to provide lunch (or other meal) for which the host will be reimbursed by prorating the cost among DRR staff and consultants. The responsible DRR employee should inform the institution of this policy at the time the visit is arranged.

"Offers by the applicant, grantee, or potential applicant to provide entertainment, sight-seeing tours, etc., prior to or subsequent to the official visit must be politely refused by the staff and consultants."

Adherence to this policy, we believe, removes staff and consultants from the possibility of any charges of conflict of interest in the discharge of their duties and does not place a grantee or applicant in the position of feeling he must "entertain" a review team. The Director, DRR, has sent this policy to the Associate Director for Extramural Programs to consider for adopting as NIH-wide policy.

Increasing numbers of requests from applicants, under the provisions of the Privacy Act, for summary statements prior to Council action are being received. Very few rebuttal letters or requests for reconsideration by the initial review group, however, have resulted subsequent to release of these summary statements. It would appear that the chief purposes for the requests are for early planning by the applicant--building up or phasing down a research effort or the preparation of a revised application. DRR policy with respect to rebuttal letters based on issues related to the initial scientific, technical merit review, is that such letters will not be brought before the National Advisory Research Resources Council. If the applicant wishes, the proposal will be returned to the initial review group for re-review.

As part of the reorganization of the former DRR Office of Program Analysis, two program analysts were assigned to the Deputy Director as a Special Projects staff. In addition to preparing responses to continuing requests from Trans-NIH Committees for analyses of scientific projects supported by DRR Programs, completely revised annual progress report forms for each of the five DRR Programs were drafted this year. Following approval by the Department and the Office of Management and Budget, the new forms will be used by DRR grantees for reporting yearly scientific progress. The revised forms hopefully will permit us to obtain, process, and analyze program data more quickly and accurately.

In Fiscal Year 1980 the Deputy Director's emphasis will be to maintain and improve the quality of program management, program analysis and initial scientific review.

DRR PROGRAM/OFFICE REPORTS

Fiscal Year 1979 has marked significant expansion of the concept of the Research Resources Information Center. The Office established the Center in 1976 and has offered project and technical guidance since that time. The objective of the RRIC is to promote the awareness of, the value of, the utilization of, and the access to DRR-supported research resources.

The further development of the Research Resources Reporter, the Center's regular print contact with scientists throughout the United States, was evinced this year by a substantial increase in circulation (mail and newsstands); by requests for reprints from such organizations as the National Society for Autistic Children, Yale University, Johns Hopkins University, the University of Virginia, the National Institute of Arthritis, Metabolism, and Digestive Diseases, and the Albany Medical Center; by a publication award from the National Association of Government Communicators; by reference to the Reporter in the Washington Post and other publications; by acceptance of the RRIC staff-written articles in professional trade publications; and by hundreds of favorable comments from scientists and administrators throughout the country--and NIH personnel at all levels.

Early in the year, a readership response form indicated conclusively that the Reporter is fulfilling its mission. A total of 1,285 readers responded to an address information form in the January issue. Approximately 99 percent of the respondents indicated they wished to continue receiving the monthly newsletter; 88 percent said they read at least 50 percent of each issue; and 98.3 percent agreed that the Reporter serves a useful line of communication among researchers.

A sampling of hundreds of favorable comments attested to the reaction of the reading audience:

University of Kansas - "I appreciate the coverage of research projects."

University of Pennsylvania - "This is an excellent publication. Keep up the good work."

Boston Biomedical Research Institute - "Mix is well chosen."

Bowman-Gray School of Medicine - "It is very good as it is."

University of South Carolina - "Give us more of the same."

Rider College - "It's almost perfect."

G. C. Searle & Company - "Great! Keep it up."

V. A. Hospital, California - "Extremely valuable."

University of Notre Dame - "I believe that the Reporter serves a useful role as a translator from a specialized researcher to an intelligent decision maker."

University of Texas - "I believe that you are doing an excellent piece of work."

NIH, Bethesda - "I enjoy and profit from present format."

NIH, Bethesda - "I like the present format, especially the research news."

The article, "Research Into Autism Yields New Insights," which appeared in the November 1978 Reporter, prompted the National Society for Autistic Children to request a large number of reprints for distribution "to parents and professionals at our regional and annual NSAC meetings." The Society also indicated they will be sending the reprint to individuals and institutions who purchase books from their bookstores.

The Reporter was also cited by the Washington Post (May 14, 1979) as an authoritative source by author James T. Yenckel. In his article on autism, Mr. Yenckel used quotations from the Reporter, giving full credit to the source.

Yale University, Johns Hopkins University, and the University of Virginia requested large numbers of reprints of the article, "Psychosocial Dwarfism and Child Abuse" from the July 1978 Reporter.

The Albany Medical College of Union University also requested reprints from the February 1978 Reporter concerning the new shock trauma techniques developed by their unit.

The National Institute of Arthritis, Metabolism, and Digestive Diseases requested reprints from the Reporter January 1979 story, "Physicians Search For Cause of Lyme Arthritis," and also from the February 1979 story, "New Test For Connective Tissue Diseases."

The monthly distribution of the Reporter continued to rise. It has gone from an initial 3,875 (January 1977) to 14,000 as of August 1979. This figure includes distribution in the U.S. and to 118 recipients in 41 foreign countries and in Puerto Rico.

The newsletter's visibility and circulation were considerably increased by additional newsstand distribution in Bethesda, and just recently at several grantee facilities. The idea for the newsstands was developed by OSHR. At present, there are nine Reporter newsstands on the NIH campus, in the Federal Building, the Landow Building, and at the Westwood Building.

The first out-of-town newsstand distribution was made during the past year. There is now a Reporter newsstand at the Schools of Medicine, University of California, San Diego, and at the University of California, San Francisco. The San Diego campus has requested another newsstand for their library entrance.

The total monthly distribution through 13 newsstands is now over 5,000.

In May, the National Association of Government Communicators gave the 1979 Second Place Blue Pencil Award to Jim Augustine, DRR Information Officer, citing the Reporter as an Outstanding Government Publication in the Newsletter Category. There were over 500 entrees submitted (in all categories) for the coveted Blue Pencil awards.

In addition to activities associated with Reporter publication, a total of 6,980 inquiries were received by the RRIC during the year. These included requests for directories, requests to be put on the Reporter mailing list, and a wide variety of mail and telephone inquiries on the subject of research resources.

The 1979 revisions of the Biotechnology Resources Directory, the Animal Resources Directory, and the Minority Biomedical Support Directory were produced and distributed during the fiscal year. The revised General Clinical Research Centers Directory is scheduled for distribution in the fall. The design and format of the 1979 directories has been changed to make for a more attractive and useful reference book. The distribution of the directories varies from 6,000 to 8,000 each.

To further promote the visibility and distribution of the RRIC products, OSHR designed and produced a special Research Resources Information Center table top exhibit. This attractive exhibit is designed to display the latest issues of the Reporter and all of the DRR Directories, in addition to the DRR program brochure.

During the latter part of the fiscal year, the RRIC has been working on the first of a series of special scientific publications based upon the research activities of DRR grantees. The publication will be entitled, Artificial Intelligence in Medicine, and will include input from the directors and principal investigators involved in DRR's Stanford University Medical Experimental Computer-Artificial Intelligence in Medicine (SUMEX-AIM) program. Printing is expected in the fall.

The OSHR office has been successful in making additional placements of outstanding articles appearing in the Reporter. Negotiations with the editors of Medical Tribune (155,000 circulation weekly) resulted in an agreement to publish medical articles from time to time in their entirety with full credit to DRR and the RRIC staff. Thus far, articles have appeared in the Medical Tribune on liver transplantation and on emotional dwarfism.

Lab Animal (over 14,000 bimonthly circulation) has run two RRIC-originated stories on the Giant Axon Squid, and on the Sloan-Kettering mice communication chemistry study.

An arrangement has been made with Newspaper Enterprise Association, national syndicate serving 750 newspapers throughout the country, to issue slightly condensed versions (800 words) of RRIC-originated stories. The first NEA syndicated wire story, sent out in July 1979, was on the bee venom studies at Johns Hopkins and the Mayo Clinic.

Public Health Reports (14,000 monthly circulation) has indicated their intention of publishing the RRIC story on lyme arthritis.

In other varied program promotional and informational activities, the OSHR has concentrated on expanding DRR program coverage by planning and participating in media briefings and special media events at DRR-funded resources. In addition, Office staffers have established a successful pattern of combining DRR regional and national program director meetings, administrative coordinator meetings, and nurses and dietitian meetings with radio, TV, and newspaper placements.

The Office made special efforts during the past year to encourage grantee institution information officers and program directors to report good science at their facility.

The effectiveness of these endeavors was evinced by a substantial number of locally-produced feature stories in various house organs throughout the country, by increased numbers of locally-produced releases, with full DRR credits, and by increased interest from DRR grantees in voluntarily calling or writing the Office to suggest potential media briefings in their city.

In the special event and press briefing activity area, the Office assisted Dr. John Markley, program director of the Purdue University nuclear magnetic spectrometry laboratory, in planning their formal dedication in West Lafayette, Indiana in November. The Office staffer also met with the Purdue University information officer to discuss promotional activities for the affair. The dedication, which featured Dr. James O'Donnell, DRR Deputy Director as the keynote speaker, was further publicized by a Purdue release, placements in the Indianapolis Star, the Purdue Exponent, the Lafayette Courier, and transmission of a 3-minute videotape from six television stations in the Indianapolis area.

In February, the Office held a media briefing at Albuquerque in cooperation with the University of New Mexico to describe new developments on a tiny insulin pump being tested at the clinical research center. The University had called OSHR and requested help in organizing a briefing for the New Mexico media. OSHR assisted with the preparation of press kit material and media contact work in the Albuquerque area. The media briefing was attended by eight Albuquerque media outlets, and the resulting coverage went well beyond the borders of New Mexico. Attending the media briefing were three TV camera crews, two radio station representatives, and three reporters from local newspapers.

In addition, the OSHR staffers personally visited the Albuquerque bureaus of the Associated Press and United Press International. The story and photos were sent across the country on both wire services. All area TV stations were supplied with a videotape of the briefing, and a wrap-up release was mailed to all newspapers and most of the radio stations in New Mexico.

In March, OSHR held a media briefing at the New Orleans Chamber of Commerce concerning a hypertension treatment compliance project being carried out through the MBS at Xavier University. In addition to the media briefing, the principal researchers were interviewed on several New Orleans area TV stations and radio shows. The story was also carried on the AP and UPI wire services. OSHR staff prepared press kits and made contacts with the local press and broadcast media.

Drs. Sidney McNairy (DRR program staff), Marcellus Grace, and Michael Thompson were the principals at the press briefing which was attended by TV, press, and radio representatives. The OSHR arranged for the taping of a 15-minute segment for "Perspective in Black" on WWL-TV with Drs. Grace and Thompson; a 10-minute live appearance of the two researchers on "Journal," Station WYES-TV; and appearances on "To Your Good Health" on WWL-TV, "Spectrum 50" at WDSU-TV, and "Good Morning New Orleans," among other TV and radio appearances. An interview with Dr. Grace and an Xavier student was taped and carried by the Mutual Black Network over 80 stations.

A GCRC progress report spotted by OSHR triggered a press briefing at the University of Rochester in May. A specially designed air-tight chamber at Strong Memorial Hospital is being used to test how airborn pollutants affect human bodies. The Rochester briefing was organized and executed by OSHR with the assistance of the University of Rochester public relations office. OSHR-prepared press kits were hand delivered to all Rochester media as well as certain key Washington-area media. The briefing was attended by local TV and newspaper representatives. Arrangements were made for Dr. Laurence Jacobs, GCRC director, to appear on WHEC-TV's "Noon at Ten" to discuss the pollutant chamber.

The Associated Press and United Press International wires carried the story. Lou Adler's "Report on Medicine" on CBS Radio, heard in the Washington area on Station WTOP, featured Dr. Jacobs discussing the chamber.

A 90-second videotape showing the pollution chamber, produced by OSHR, was mailed with a script to all commercial TV stations in New York State. A spot check indicated that more than half of these stations used the videotape.

The media activities for the Seventh Annual Minority Biomedical Support Symposium in Atlanta during April were highlighted by a continuous stream of radio and TV interviews set up by the Office staffers from the Press Room at the Atlanta Marriott Downtown Hotel. Individual telephone interviews for the Mutual Black Network from the MBS Symposium Press Room included Dr. Sidney McNairy, DRR; Dr. George Hillyer, University of Puerto Rico; Dr. Ciriaco Gonzales, DRR; Dr. Michael Thompson, Xavier University; Dr. Rosalind Cropper, graduate of Southern University; and Dr. Cyril Moore of Morehouse College.

Dr. Gonzales, Dr. James Henderson, Tuskegee University MBS program director, and Xavier student Larry Lowe participated in a 30-minute MBS discussion on "A Second Look," a regional Educational Network program seen on eight educational TV stations in Georgia, Florida, Alabama, and South Carolina.

Dr. Clarence Clark of Morehouse College taped a 30-minute program on Radio Station WIGO and also made a 2-minute live appearance on "Noon News," on WSB-TV; Dr. Charles Huggins, Nobel Laureate from the University of Chicago, and Dr. Frank Hamilton of Atlanta University appeared on a call-in program on Radio Station WBS; Dr. Gonzales did a 3-minute live interview on Station WXIA-TV; Dr. Clarence Clark and one of his MBS students taped a 30-minute discussion on MBS for "Ebony Journal," Station WXIA-TV; Dr. Clark and a MBS student took part in a 30-minute show on Station WAGA-TV; and Dr. Michael Thompson and MBS student Pamela Freeman of Xavier did a 20-minute show on Radio Station WQXI.

The Associated Press interviewed Dr. Marcellus Grace for a story sent over the AP wire from Atlanta.

In addition to arranging the interviews, press materials on the MBS Symposium were hand delivered to the Atlanta media by the Office staff. During the Symposium, OSHR staffed the Press Room and gave assistance to press representatives covering the meeting, including the Atlanta Constitution, the Atlanta Journal, the Atlanta Daily World, the Atlanta Inquirer, the Atlanta Voice, Jet Magazine, and representatives from the broadcast media mentioned above.

The Office embarked upon a heavy speaker presentation series during the year commencing with a 3-man presentation to the National Advisory Research Resources Council on OSHR operations.

The next presentation was made by Jim Augustine and Bill Glitz at the Second National Conference of Administrative Coordinators in San Antonio, Texas (Sept. 19-23). Their topic was "Visibility--To Be Seen Is To Be Understood." A spin-off of the OSHR talk was the formation of the GCRC Administrative Coordinators Communication Subcommittee to encourage a steady flow of communication about GCRC research activities from GCRCs to OSHR.

In November, an OSHR staffer appeared at the Administrative Coordinators regional meeting in Oklahoma City. The RRIC Table Top Exhibit was on display at the meeting. Follow-up letters were sent out to ACs and also nurses and dietitians.

In December, Jim Augustine and Bill Glitz made a presentation before the Minority Biomedical Support Program Directors Meeting in Houston, Texas. The theme of the talk was on communication to the scientific community and the general public. The OSHR team also arranged individual media interviews for Drs. Ciriaco Gonzales and Sidney McNairy on Stations KPRC-TV, KTRK-TV, KHOU-TV, and Radio Station KPRC. The Houston Post interviewed Drs. Gonzales and McNairy and wrote a feature article on the MBS Program. In addition, the Informer and Texas Freeman and the Houston Chronicle did feature stories with a local angle.

In February, the OSHR presenters conducted a 12-person workshop sponsored by the Communications Subcommittee of the GCRC Administrative Coordinators in San Francisco. The presentation included a videotape talk by Dr. Bowery, and was geared to familiarize the ACs with the DRR information operation and to aid in the communication of information from the GCRCs to OSHR.

In February, Jim Augustine and Bill Glitz appeared before the Eta Sigma Gamma, a health educator honorary society at the University of New Mexico in Albuquerque, to deliver their presentation, "You Need To Communicate If You're Going to Educate."

Jim Augustine, DRR Information Officer, conducted a Freedom of Information Grants Training Workshop in November. A commendation for the presentation was made by the NIH Associate Director for Communications.

In addition to the creation of the RRIC Table Top Exhibit during the year, the OSHR office designed and produced a full-scale exhibit for the Biotechnology Resources Program. Called "Biotechnology Resources, New Technologies and Procedures for Biomedical Research," the full-size exhibit is arranged to attractively display the Biotechnology Resources directory, PROPHET literature, DRR literature, or any associated Biotechnology Resource material to be produced and distributed in the future. The exhibit made its debut at the Federation of American Societies for Experimental Biology Convention in April at Dallas, Texas. Its second showing took place at the Annual Meeting of the Electron Microscopy Society of America in San Antonio, Texas on August 13-16, 1979.

Special exclusive articles were written and placed by OSHR during the year for such publications as Black Careers, Jet, Urban Health, Nuestro, Essence, the Mayo Alumnus, and Computers and Medicine.

During the year, the Office placed an article on CLINFO and a piece about Cincinnati's General Clinical Research Center studies on artificial fat in the Journal of the American Medical Association.

Further OSHR placements on DRR program activities included a cover photo for ILAR News of a Yerkes gorilla; a syndicated photo story sent over the wire by Newspaper Enterprises Association on the University of Texas Biomedical Institute's work on squid capture; HEW's NOW did a piece on GCRC centers; U.S. Medicine wrote stories on kepone detoxification at the Medical College of Virginia and on baking soda dosage treatment for short stature connected with a kidney disorder at the University of California Pediatric Clinical Center, San Francisco; MD Magazine told the story of amyloid studies on Celebes apes at the Oregon Regional Primate Research Center; a cover photo appeared in Lab Animal of another Yerkes gorilla; Children Today featured a full-page photo story on the NIH Primate Research Centers; and Vogue ran a consumer-slanted feature on the Cincinnati GCRC study on artificial fat.

During the year, the Office received and responded to over 30 individual mail requests for photos for use in publications throughout the country. To name a few, requests came from John Wiley & Sons, publishers of the book, Biology; the Journal, a newsletter of the Institute of Socioeconomic Studies; United Press International Science Services; Encyclopedia Britannica; Visual Education Consultants, Inc.; the Bulletin, Loyola Marymount University; the U.S. Information Agency; Omni Magazine; Forum on Medicine; Intercom, Duke University; Current Health Magazine; Medical Tribune; Life & Health; the publishers of the book Apes in Fact and Fiction; Medical Group News; Newsweek Books; and University News Service, University of Minnesota.

As the year drew to a close, a 2-minute videotape segment showing muscular dystrophy research at the University of Rochester General Clinical Research Center was being readied by OSHR for the nationally televised Jerry Lewis-Muscular Dystrophy Association Labor Day Telethon, telecast over approximately 215 stations throughout the country.

According to A.C. Nielsen Company, the Telethon, in 1978, was viewed by a national audience estimated at 88 million. It was rated the second most watched TV program in the U.S. last year.

OSHR originated the idea for the segment by contacting the Muscular Dystrophy Association, followed through by securing the cooperation of the GCRC personnel and investigators in Rochester, supervised the shooting of more than two hours of videotape by AV staff at the University of Rochester, and devoted several days to editing at the NIH TV studios.

The Muscular Dystrophy Association has also asked permission to use the videotape material for additional purposes following this year's telethon. OSHR has also arranged for the University of Rochester GCRC investigators to appear live on local breaks at the Rochester, New York TV Station, WHEC-TV.

In DRR publication-producing activities, the Office completely revised the popular foldout, Do We Care About Research Animals?, detailing the need and contributions of laboratory animals to biomedical research. A mailing and release was made to all laboratory animal grantees and to the veterinary interest press. The revised printing run of 8,000 was depleted by July 1979, and it was necessary to reprint an additional 20,000.

The Office handled the production of the 70-page 1978 revision of the Guide for the Care and Use of Laboratory Animals, with the press run for the NIH animal care guide, which has become a standard reference, set at 50,000.

Another major OSHR publication project was the revised edition of NIH Primate Research Centers: A Major Scientific Resource. The publication was completely revised with new text and photos. The co-editors, Jim Augustine and Jerry Gordon, were recognized by the American Medical Writers Association (Mid-Atlantic Chapter) which gave them their 1979 First Place Award for "distinguished medical writing for booklets/brochures for professional audiences."

The NIH Minority (Extramural) Research and Training Programs booklet was also revised by OSHR during the year.

A total of 19 DRR wall plaques were produced and distributed to DRR grantee locations by OSHR.

During the fiscal year, the Office received and processed approximately 79 Freedom of Information requests. This represents a slight increase over last year. Approximately 400 hours of clerical and professional time was spent handling these requests.

The Office received and processed 88 Privacy Act requests, representing also about 400 hours of clerical and professional time.

During the year, one of the OSHR staffers was selected as the DRR Coordinator for the 1978 NIH U.S. Savings Bond Campaign. A series of seven financial seminars was conducted by the OSHR staffer in which the entire savings and investment spectrum was carefully discussed. DRR ended up with the third highest percentage of new U.S. Bond employee participation for the year.

The number of publications distributed by OSHR continued to rise. A total of 34,822 publications were distributed through the Office during the year. The Office received 14,677 individual mail requests; 350 individual telephone requests, including Congressional; and 70 individual walk-in requests. Other distribution was made by bulk mail requests and at the NIH Visitors Center.

Office of Administrative Management

The Office of Administrative Management, Division of Research Resources, plans, implements, and evaluates administrative and management services and support to the programs and activities of the Division of Research Resources, and, specifically, provides budgetary support and personnel management, services, and advice; plans and operates the Division of Research Resources data system; provides staff support in planning, evaluation, legislation, and analysis; and participates in special projects, analyses, and studies. The Office of Administrative Management comprises the Special Assistant for Management Planning and Evaluation and the staffs of four Sections--Financial Management, Personnel Management, Administrative Operations, and Data Management--who carry out this mission and report to the Executive Officer, Division of Research Resources.

We concentrated our efforts this year in five areas: program performance evaluations of the Division's programs; automating parts of our budget formulation and justification processes; acting on the Division's Affirmative Action Plan; exercising increased control over direct operations and program management funds; and redesigning the Division's computer-based information system.

PROGRAM EVALUATION

This year, the Department required that the Division of Research Resources develop plans to evaluate the impact of all its programs. In addition to becoming acquainted with the DHEW and NIH program evaluation personnel and policies, we began to explain evaluation, and the Department's policies in that area, to the Division's Program Directors and other senior staff. These training activities will receive greater attention next year as specific evaluation plans and schedules are developed for each program.

We began collaborating with the Program Directors to modify, as necessary, their objectives as developed for the Division's Five-Year Plan so that these objectives can be used to develop indicators of program performance. This work will enable us to propose evaluability assessments in the Fiscal Year 1981 Evaluation Plan, or sooner if sufficient progress is made in one or more programs.

FINANCIAL MANAGEMENT

The Financial Management Section staff formulate, present, and execute the Division of Research Resources budget. Specifically, this Section prepares budget request documents, including schedules and narrative justifications; provides funding and position control data; prepares financial reports required by the Division of Research Resources, NIH, Office of Management and Budget, and the Congress; provides guidance and technical assistance for management of each of the Division's programs; and reviews and analyzes program financial operations.

The accomplishments of this Section were:

- The methods used to forecast the Division's direct operations and program management funding requirements were refined and modified. Accurate forecasting is essential to ensure adequate funding allowances for direct

operations and program management while simultaneously permitting as much funding as possible for awards to be made by the Division's programs. Careful analyses of projected needs such as personal services and benefits, consultant services, travel, automatic data processing, etc., were made by the Financial Management staff after conferring several times during the year with the Division's Program Directors, the Executive Officer, and the Administrative Officer. Precise projections complemented by close monitoring of the Division's funds by the Financial Management staff throughout the year, making adjustments as necessary through reprogramming the Division's programs, refined our control of direct operations and program management funds. This increased control keeps operating expenses to a minimum, thus making available the maximum amount of funds for awards.

- Closer interaction between the Financial Management Section and the Data Management Section fostered a broader knowledge of data--what is needed, what is available, what can be provided, etc. One benefit resulting from this closer interaction was an end-of-year grants and contracts report designed by the Data Management staff in response to Financial Management needs in preparing budget submissions and budget request documents as well as projecting future funding requirements of the Division's programs.

- Parts of our budget formulation and justification processes were automated. This facilitated more rapid retrieval and updating of data, thus enabling us to better meet the extremely short deadlines frequently imposed upon various financial reports, special budget request documents, and major budget submission revisions. Automation also reduced the amount of overtime required.

PERSONNEL MANAGEMENT

The Personnel Management Section staff advise the Division on all aspects of personnel management; and provide central personnel management services, leadership and planning on personnel policy development, training, recruitment, employee development, and equal employment opportunity. These functions are reflected in this Section's accomplishments, listed below.

The following steps were taken to comply with the Division's Affirmative Action Plan and recruitment plan.

- To increase the number of minorities and women in professional job series and mid- and upper-level supervisory positions, the Personnel Management Section requested the Minority Recruitment Section, NIH, to provide applications for all the Division's professional and supervisory recruitment actions. On all other vacancies the Applicant Referral File, EEO Coordinators for the National Heart, Lung, and Blood Institute, and the National Institute of Child Health and Human Development, as well as the Minority Recruitment Section, NIH, were contacted. The Division filled the following professional and supervisory positions:

  Four Division women moved from clerical and technical positions to professional positions;

One Division woman moved to a supervisory professional position;

Two men were selected for professional positions from the Special Placement Register.

- The Personnel Management Section sent source information to all Program Directors and supervisors about recruiting women and minorities. In addition, the Handbook for Recruitment at Minority Colleges was made available.

- All selection criteria and factors affecting eligibility were carefully reviewed to ensure fairness and reasonableness.

- The Division employed one handicapped person. We contacted rehabilitation centers for information on handicapped persons and their skills to provide recruiting officials with information on potential applicants.

The Personnel Management Section will conduct Career Path Seminars for supervisors to aid them in counseling employees on career objectives. This Section will also help to design intra-office training activities to provide developmental experience to employees. Three-year audits to affirm or correct position classifications are being completed on schedule, and every secretarial and clerical position will be reviewed to assure its proper classification under the new Factor Evaluation System standards.

The Personnel Management Section is acting on several Civil Service Reform Act provisions. Supervisors have been advised on the new performance measures; Senior Executive positions as well as supervisory and management positions have been identified, and Senior Executive actions have been processed. Certain Civil Service Reform policies were sent, and will continue to be sent, to affected Division employees.

ADMINISTRATIVE OPERATIONS

The Administrative Operations Section staff provide the Division of Research Resources with overall management analysis and administrative support services such as procurement, space management, travel, and property accountability. This Section also advises key Division officials on administrative policies and practices.

The following were accomplished in the past year:

- The Administrative Operations Section developed an expenditure plan which identified continuing obligations and planned procurement for each quarter.

- The Administrative Operations Section began using new object classification codes, which identify the purpose of travel, to establish firmer control over travel expenditures. Correct object classification coding ensures correct accounting reports, and accurate projections of future travel needs and ceiling constraints.

- This Section submitted an improved automatic data processing plan to the PHS. This improved quality resulted from greater interaction and sharing of responsibility with the Data Management Section, with a corresponding increase in flow and accuracy of information.

- Because Division staff needs a greater word-processing capability, the rental of a scanner/reader is being considered. This machine would complement our other word processors, thus creating a unit of interacting equipment, and would produce man-hour, and thereby dollar, savings, and increase overall productivity.

DATA MANAGEMENT

The mission of the Data Management Section is twofold. This Section (1) designs, develops, operates, maintains, and modifies the Division's computer-based information systems, which include data related to grants, contracts, and other extramural awards made by the Division of Research Resources, as well as the budget workload and related internal operations; and (2) provides data and information for management controls and Division activities.

During this fiscal year, the Data Management Section, with the assistance of the Division of Computer Research and Technology, continued to improve the performance of the Division's information system. During the Fall of 1978, requirements to be satisfied by the information system were defined, which included the limits caused by resources available to operate a system, the user and performance requirements, and the physical parameters, e.g., the number of logical files, data elements, and records. Updating and file restructuring frequencies were determined from prior experience. After reviewing several system-design options, it was determined that a single data base management system could not meet all the Division's needs, thus several applications and system packages will be used, with Mark IV as the principal system package.

New equipment was installed, including three new NIH 7000 display terminals (CRTs) and two Datagraphix terminals. These terminals operate more than eight times as fast as the previously used IBM 2741 terminals. Since display terminals do not automatically provide paper copy, two hardcopy printers (terminals) will be attached to the NIH 7000s. Finally, an IBM 3776 printer was installed and is shared with the National Institute on Aging.

Other significant accomplishments of the past year follow:

- The Division of Research Grants system, IMPAC (and soon CRISP), now provides basic grant information to the Division.

- Through collaboration with pertinent Division personnel, reporting requirements were defined and the number of required reports reduced from 44 to 27.

- A new subsystem was established to identify grants and contracts support to users of the Division-funded resources.

- The first version of the Division of Research Resources Information System Users' Guide was written.

Mark IV's interactive on-line query capability will be implemented in early Fiscal Year 1980. Most user requirements will be satisfied by the present system design; however, Mark IV's inherent flexibility and accessibility should provide a reasonable and easily changed information management system over the next several years.

Fiscal Year 1979
Annual Report
Office of Grants and Contracts Management
Division of Research Resources

The Office of Grants and Contracts Management (OGCM) staff continued to play their important role in the review, negotiation, award making, and the administration of the ongoing grant programs, as well as aiding in the administration of contracts that are made by the Division of Contracts and Grants. During FY 1979, grant awards were made to 795 grantees in the amount of $149,926,000 and 28 contracts were made in the amount of $4,630,000. The types, number and amount of grants and contracts awarded during FY 1979 are as follows:

FY 1979

Grants			R & D Contracts		
		(Dollars in Thousands)			
Type	Number	Amount	Type	Number	Amount
1	37	$ 3,635	1	3	$ 898
2	46	19,228	2	5	1,437
3	46	3,036	3	5	653
5	665	124,012	5	15	1,686
7	1	14			
Total	795	$149,926 1/	Total	28	$ 4,630 2/

Again, during FY 1979, there has been a considerable increase in the intra-agency activity for the Minority Biomedical Support program. In FY 1979 there were ten (10) agreements with NIH Institutes and NIMH totaling $4,595,632, compared to seven (7) in FY 1979, and a 32 percent increase in dollar amount over FY 1979. This activity resulted in a large increase in work load for the OGCM staff.

OGCM and the Data Base Management Section of the DRR Office of Administrative Management during the past fiscal year worked closely together in setting up computerized systems that will furnish information, i.e., commitment base listing, approved/unfunded grants pay lists, and an MBS intra-agency subproject listing. It is expected that the above and other date information will be available early in FY 1980. The Data Base Management Section continued to provide personnel support to enter budget and progress report

1/ Includes $4,946,000 in other than DRR appropriated funds.

2/ Includes $1,174,000 in other than DRR appropriated funds.

information into the data information system. If personnel are available, it is planned in FY 1980 that OGCM will provide the input into the data base. The necessary terminals will be placed in OGCM.

During FY 1979, OGCM personnel assigned to the Animal and Biotechnology Resources programs were put under one supervisor, thereby eliminating one OGCM position to be used elsewhere within the Division. A new Grants Management Specialist supervisor was assigned to the General Clinical Resource Centers program. After almost completing her training, the Stride encumbent transferred to NHLBI, thus delaying plans for filling a vacancy in the future brought about by retirement.

OGCM staff participated in the Grants Management Advisory Committee Workshop, the NIH Grants Management seminar at Duke, the annual Minority Biomedical Support symposium at Atlanta, the workshop for the new Administrative Coordinators at General Clinical Research Centers, and the Biomedical Research Support Grant program directors' meetings at Boston, San Francisco and Los Angeles.

OGCM completed its physical moves and purchased a new filing system which freed up considerable space. Permission was obtained to send grant files to the Records Center after the end of a project period rather than holding until grant was completely closed out, thereby giving us additional space. Since many DRR resource grants have been ongoing for over twenty years, filing of grant folders has become a major problem.

Fiscal Year 1979 Annual Report
Animal Resources Program Branch
Division of Research Resources

INTRODUCTION

The overall objective of the Animal Resources Program Branch (ARB) is to support resource projects that provide, or enable biomedical scientists to use effectively, animals in human health related research. Special attention is given to those animal resource activities that are broadly supportive of the missions of the various NIH components. The Branch objectives are accomplished through a Primate Research Centers Program and a Laboratory Animal Sciences Program.

PRIMATE RESEARCH CENTERS PROGRAM

The seven Primate Research Centers (PRC's) which comprise this program were established with NIH funds during the period of 1961-1965. The Centers and their respective locations are: Washington PRC, Seattle, Washington; Oregon PRC, Beaverton, Oregon; California PRC, Davis, California; Delta PRC, Covington, Louisiana; Yerkes PRC, Atlanta, Georgia; New England PRC, Southborough, Massachusetts; and Wisconsin PRC, Madison, Wisconsin. Each of these Centers is affiliated with a host academic institution. The Centers have unique resources and research environments which are suitable for a broad range of biomedical research areas. The Animal Resources Branch provides core operational support for the Centers through resource grants. Research projects at the Centers are funded largely by NIH categorical institutes, other federal agencies and private foundations through grants and contracts which are held by core staff and collaborative/affiliated scientists. Through their use of nonhuman primate models, these scientists have made many important contributions to biomedical research. During the past year, investigations have been carried out in numerous areas, including reproductive biology, infectious diseases, behavioral sciences, neurosciences, toxicology, nutritional and metabolic diseases and environmental health.

Core support in the amount of $15.242 million provided by this Program in Fiscal Year 1979 has enabled the 145 core staff doctoral-level scientists to conduct research in the Center facilities on 214 projects. These research projects were funded by approximately $3.9 million from 103 NIH research grant/contract awards and $1.5 million from other federal and nonfederal agencies. In addition, the resources and services of the seven Centers were made available to 504 collaborative and affiliated scientists from various academic institutions who conducted research on 136 projects supported by $3.7 million from NIH grants and contracts and $0.7 million from other sources. The Centers also provided research training environments for 215 graduate students engaged in thesis-related research, as well as for 33 visiting scientists. The Program provided salary support for 675 doctoral level, technical and administrative staff personnel.

On a regional basis, the 7 Centers provided a total of over 7,700 biological specimens to 328 scientists. As one measure of their continued scientific productivity, over 900 journal articles and books were published during the past year by the core staff and affiliated/collaborative scientists within the 7 Centers.

The restricted supplies of nonhuman primates available from their countries of origin has continued to cause special emphasis to be placed on domestic breeding of those primate species which are most widely used in the research programs of the Centers. Approximately 1,700 infants and fetuses were produced by the Centers during the past year, representing 60-65 percent of their actual requirements. Small nuclear colonies of a number of less commonly used species were also maintained to assure their survival for future research needs.

The major research themes of each Center and selected examples of research activities during the past year are as follows:

WASHINGTON PRIMATE RESEARCH CENTER, UNIVERSITY OF WASHINGTON AT SEATTLE

The basic research themes of the Washington Center cover the areas of neurological sciences, cardiovascular function, developmental biology, disease models, endocrinology and metabolism and craniofacial structure and function. An extensive collaborative program involved over 60 scientists engaged in a variety of investigative areas. An example of these research activities at the Washington Center is as follows:

Study On Hyaline Membrane Disease

The overall goal of this project is to determine the basic causes and pathophysiology of hyaline membrane disease (HMD) which affects human infants. Macaca nemestrina, which were prematurely delivered by Caesarian section, are used as the animal model (homologue) for these studies. Previous studies at the Washington Primate Research Center have shown that a large proporation (2/3) of the animals prematurely delivered by Caesarian section at approximately 137 days gestation will develop HMD complications that are comparable in their clinical radiologic and pathological features to those observed in human infants. The infant monkeys with HMD demonstrate a decrease in surface active phospholipids in lung tissue and lung wash by 3 hours of age, with no further decrease by 6 hours of age. There is extensive damage of type II epithelial cells, endothelial cells, and bronchiolar epithelial cells, as well as a reduction in lung volume and pressure volume stability. Further studies have attempted to elucidate whether HMD is due to a defect in synthesis of surface active material (SAM) in the type II pneumocyte, a decrease in tissue stores of SAM, or a decrease in secretion of SAM onto the alveolar surface of the lung.

During the past year, various types of analyses have been performed on lung tissue from 18 infant monkeys. No measurable differences were found between

diseased and control animals in the uptake, synthesis or release of surface active phospholipids. Electron microscopic (EM) studies were made on the right upper lung lobe of 10 animals to determine if there was a reduction in the number of type II cells per alveolus in HMD compared to air-breathing controls and to compare the ratios of various cell types within the alveolus (air sac). Preliminary analysis indicates that control animals have a higher number of differentiated type II cells in relation to undifferentiated cells and type I cells, and more lamellar bodies per type II cell than do the lungs of the animals with HMD. The pulmonary parenchyma in HMD has a statistically significant decrease in air/tissue ratio between 3 and 6 hours, indicating that structural changes in the alveolar septum occur in this disease. These studies, including additional work to determine the nature of sequential alveolar collapse in infant monkeys with HMD, are continuing.

OREGON PRIMATE RESEARCH CENTER, UNIVERSITY OF OREGON HEALTH SCIENCES CENTER

Areas of research emphasis at the Oregon Center include reproductive biology, perinatal physiology, cardiovascular pathology, cutaneous biology, immunology, nutrition and metabolic diseases and behavior. An example of activities during the past year is as follows:

Spontaneous Diabetes In Macaca nigra

Spontaneous diabetes in the Celebes Ape (Macaca nigra) has been further characterized metabolically and pathologically and relationships have been established between diabetes mellitus and the development of atherosclerosis.

An increase in glucagon is indicative of diabetes in humans. Concentrations of glucagon in Macaca nigra were found to be significantly greater than human values and biochemical studies have been made to identify the nature of this immunoreactivity. A five-fold increase in immunoreactive forms of glucagon (IRG) was found in borderline diabetics vs. non-diabetic animals. This finding is a useful tool for the diagnosis of impending diabetes, since the increase in IRG precedes clinically detectable signs.

By use of various techniques, aortic atherosclerosis has been quantified and correlated with indexes of clinical diabetes in each animal. Greater aortic atherosclerosis was found with increased levels of clinical diabetes. A causal link has also been established between a specific pathologic lesion in the islets of Langerhans of the pancreas and the expression of hormonal and metabolic aberrations which are then followed by the development of secondary complications. Because the events in the islets of Langerhans occur concurrently with the appearance of amyloid and secondary cell malfunctions, and because these events precede the clinical appearance of diabetes; the name "insular amyloidotic diabetes mellitus" has been proposed for this syndrome.

CALIFORNIA PRIMATE RESEARCH CENTER, UNIVERSITY OF CALIFORNIA AT DAVIS

The major research emphasis of the California Center relates to environmental health sciences and infectious diseases. Other areas under investigation include perinatal biology, behavioral biology, respiratory physiology and immunology. An example of research activities during the past year is as follows:

Pulmonary Mechanics of Nonhuman Primates

Physiological studies have been conducted on the following pulmonary physiology areas: (1) control of breathing, (2) lung volumes and static mechanics, (3) pulmonary flow-volume relationships, (4) response of nonhuman primates (rhesus and bonnet macaques) to general anesthetics, and (5) reactivit of the nonhuman primate pulmonary system to inhaled environmental pollutants.

These studies have revealed some new and unique properties of the nonhuman primate respiratory system. One of the most striking features is the relatively stiff chest wall of the nonhuman primates which is associated with a relatively high resting and expiratory lung volume (approximately 65% of the total lung capacity). This is notably different from the human lung. It is also of interest that the nonhuman primate's residual volume is determined by airway closure, despite their stiff chest wall. The control studies demonstrated that the nonhuman primate uses two strategies to breathe, one similar to man's and the other unlike that of man's. Studies are continuing to further define the basic mechanisms underlying normal respiration in nonhuman primates and to clarify their responses to low-level air pollutants.

DELTA PRIMATE RESEARCH CENTER, TULANE UNIVERSITY

The Delta Center's research programs cover the areas of infectious diseases (a major focus), as well as the areas of immunology, parasitology, biochemistry, neurobiology and urology. An example of their research accomplishments during the past year is as follows:

Prenatal Irradiation Effects On Primate Brain

The objectives of this investigation are to determine the effects of prenatal (in utero) Cobalt-60 irradiation on postnatal development of the nervous, endocrine and immune systems of squirrel monkey offspring. Behavioral, neurochemical, morphological and immunological studies were conducted on animals in four groups: Sham-irradiated control, 10, 100 and 200 rads (R). The results are summarized as follows:

Behavioral tests showed that prenatal irradiation (100 R) caused significant deficits in postnatal visual discrimination at 90 and 365 days after birth, but not at 730 days in squirrel monkey offspring. Adverse effects on reversal of original learning were highly significant at 90, 365 and 730 days after birth. These effects were also related to significant effects on motivation, orientation, hyperactivity and motor performance. Additional

studies are now in progress to establish low-dose (10 R) threshold effects on behavior and to determine if these effects persist from infancy to maturity.

Neurochemical Studies: Morphometric examinations and chemical analyses have been performed on brain tissue of infants (30 days, 1 year and 2 years after birth) that had been irradiated prenatally. The visual, somatosensory, motor, auditory and frontal cortical areas have been analyzed for various enzymes, while relevant chemical assays were performed on midbrain tissue of these animals. These data are currently being evaluated.

Morphological studies showed that neuron and glial cell packing densities were significantly lower in irradiated than control animals. Dendritic spine densities in the giant cells of Meynert of the visual cortex were significantly lower in irradiated than control animals. The neuron population and dendritic spine densities in the hippocampus were markedly decreased in irradiated animals.

Immunology studies demonstrated that prenatal irradiation at 100 R resulted in decreased percentages of blood lymphocytes with surface IgM and decreased blastogenic responses to pokeweed nitrogen (PWM) by lymphocytes from blood, spleen and lymph nodes. These effects were not apparent in irradiated animals at 30 days to 7 weeks age, but were observed in animals 14 weeks to 1 or 2 years of age. These results indicate a deficiency of B-lymphocytes in the animals that were irradiated prenatally at 100 R.

YERKES PRIMATE RESEARCH CENTER, EMORY UNIVERSITY

Research at the Yerkes Center includes psychobiology of great apes and monkeys, anatomical and physiological aspects of the central nervous system, muscle pathology, reproductive biology, immunology and language acquisition. An example of their activities during the past year is as follows:

Immunological Aspects of Malignant Melanoma:

Malignant melanoma tumors of humans spread rapidly and are frequenty fatal. Investigations at the Yerkes Center have used hyperimmunized chimpanzees and monkeys to produce antisera and antibodies to human melanoma cancer cells. Since man and the great apes share certain tissue alloantigens and certain cross-reacting species antigens, the chimpanzee renders a more specific antibody than is obtainable from other experimental animals. After absorption with normal cells from the tumor donor, both the chimpanzee and monkey antibodies were specifically toxic to human melanoma tumor cells. To date, this antisera has been used successfully in immunofluoresence, immunoprecipitation, and radioautography studies. The antibody has been radiolabeled without significant loss of activity.

Investigations are now proceeding in use of the antibody to clarify the nature of the human immune response to this malignant tumor. The antibody has been used successfully in identifying undifferentiated tissue as melanoma in origin. Human melanoma tumors have been grown in athymic mice and it was demonstrated that the antibody administered to the mouse

specifically goes to the tumor. With further development, these findings may permit specific radioscanning for tumor localization and tumor diagnosis.

Studies are currently underway to further refine these techniques, as well as to develop a radioimmunoassay for immunodiagnostic purposes for this human malignancy. Thus, serological diagnosis, radioscanning localization and radioimmunodiagnosis will be the obvious clinical applications from this research effort.

NEW ENGLAND PRIMATE RESEARCH CENTER, (HARVARD UNIVERSITY), SOUTHBOROUGH, MASSACHUSETTS

The New England Center's core research program covers the areas of infectious diseases, psychobiology, pathobiology, viral oncology and diseases of primates. The Center's extensive collaborative research program includes numerous other biomedical areas of investigation. An example of research conducted in the collaborative program at the New England Center during the past year is as follows:

Development Of Erythropoiesis In The Primate Fetus

A study of the response of the nonhuman primate fetus (Macaca mulatta) to blood loss anemia was advanced by the completion of several experiments. For the first time, fetal erythropoietic response was quantitatively measured by a technique involving red blood cell incorporation of 59Fe. On the basis of 59Fe uptake at 24 hours, these studies demonstrated elevated erythropoietic activity in 25 to 30 percent of the anemic fetuses, as compared to data from control animals. In addition to reticulocyte counts, this technique provides another means for quantifying fetal erythropoietic responses in this condition.

A related collaborative project has been initiated to elucidate the factors which control the change during late pregnancy from fetal (L chain) to adult (B chain) hemoglobin. Modified laboratory techniques have demonstrated a progressive change-over from fetal to adult type hemoglobin with advancing gestation. This change-over is more rapid in the nonhuman primate than in the human and is nearly complete at the time of birth. In tissue culture, fetal cells from blood and bone marrow developed colonies more rapidly than equivalent adult cells. Fetal cell colonies developed without exogenous erythropoietin, whereas adult erythroid colonies did not develop in the absence of erythropoietin.

WISCONSIN PRIMATE RESEARCH CENTER, UNIVERSITY OF WISCONSIN AT MADISON

Focused areas of research at the Wisconsin Center include endocrinology, behavior, neuroscience, reproduction and pathology of environmental pollutants. An example of research performed during the past year is as follows:

Studies On Maternal Behavioral Relationships with Infants

Two distinct social behavior studies dealing with maternal-infant relationships were initiated at the Wisconsin Center. The first study concerns the maternal relationship that has developed between a nonhuman primate mother and her youngest infant. As in humans, it can be assumed that this particular relationship may be affected by the birth of a new infant, if only due to the fact that the mother has less time to devote to her previous infant. A group of 54 rhesus monkeys (Macaca mulatta) which have been housed together at the Center since their original capture as a natural social troop are being examined in the study. The objective of this work is to determine whether this change influences the quality and frequency of behavioral interactions, especially those affiliative types that can be termed "aunting" or care-giving behaviors, between the infant and members of other classes of individuals of the troop. Observational data are being collected for each 9-12 month old infant approximately 12 weeks before the birth of their sibling. Their social interactions will be compared to those of mothers who are not yet pregnant to establish an association between the behaviors of mothers and infants. The study is being continued.

The second project, also with rhesus monkeys, is a systematic study of variables concerning the maternal adoption of young infant primates by females other than their biological mothers. Preliminary observations have been used to develop behavioral criteria which define complete adoption in females that have not lived with infants for at least 6 months. Whether the maternal behavior displayed by these non-mothers corresponds to that shown by natural mothers with their own infants remains under study. Results thus far have shown that approximately 80% of the adult multiparous females (who themselves were reared under natural field conditions) immediately adopted 2-12 day old infants that were presented to them. However, the adult, laboratory-reared, multiparous females have not adopted even when an infant is presented to them for one hour each day for 10 days. The ovarian hormonal condition of multiparous females does not appear to affect the probability of adoption occurring under these testing conditions, since 80% of the multiparous females will adopt regardless of whether they are intact, ovariectomized or post-menopausal. Other factors that are still to be investigated include the effects of parity and rearing on adoption.

OTHER PRIMATE RESOURCES

In addition to the Primate Research Centers, the Animal Resources Program Branch supports other primate resource activities. These are as follows:

CARIBBEAN PRIMATE CENTER

This primate resource includes a basic primate colony on the Puerto Rican mainland and semi-free ranging primate colonies on islands off the coast of Puerto Rico. The Center is a valuable resource for research on primate social behavior and is an important breeding center. The Bureau of Biologics, FDA; the National Institute of Neurological and

Communicative Disorders and Stroke; and the Animal Resources Branch all have primate production projects at this Center.

PRIMATE SUPPLY

The Animal Resources Branch at the end of the fiscal year will have six contracts and five grants for the domestic breeding of nonhuman primates. In addition, there is a contract for a Primate Supply Information Clearinghouse. These projects are part of the effort to assure a supply of primates for essential biomedical activities in the face of drastically curtailed importation of wild caught animals. During fiscal 1979 the supply of rhesus monkeys became even more critical because Bangladesh stopped the export of all nonhuman primates. With the loss of this source of animals, practically no rhesus monkeys are being imported. At one time, rhesus monkeys were the most popular research primate.

The contracts are for production of animals for general distribution to NIH extramural investigators. The overall goal of these projects is to provide 1,200 rhesus monkeys, 150 cynomolgus monkeys and 400 squirrel monkeys per year. Each of the contract supported projects is supposed to attain their goal at different dates over the next three years. The squirrel monkey breeding projects will not meet their goals because of difficulty in obtaining breeding stock, losses due to disease, and lower than anticipated reproductive rates. The rhesus and cynomolgus monkey breeding projects will probably come close to meeting their goals. In FY 79, 348 rhesus monkeys, 81 squirrel monkeys, and 22 cynomolgus monkeys have been allocated to NIH extramural investigators from these projects. In addition, 200 rhesus monkeys were provided to Lederle Laboratories at the request of the Food and Drug Administration for safety testing of polio vaccine.

The grant-supported primate breeding projects are for the research and development of breeding techniques as well as the establishment of specialized production colonies. One project was for breeding the endangered species Saguinus oedipus (cotton-topped marmoset), one for developing owl monkey production, one for baboon production, and two projects are to develop production of several species of marmosets.

The Primate Supply Information Clearinghouse is designed to facilitate maximum research utilization of primates already in this country. It functions to match requests for primates, primate tissues and related services with investigators and breeding colonies who have these items available. It provides a means by which primates that have been utilized in a research project, but are no longer needed, can be directed to another research project. During the first 18 months of its operation, a total of 4,242 primates were placed; and cadavers, blood samples and tissues were obtained for 177 projects.

LABORATORY ANIMAL SCIENCES PROGRAM

The Laboratory Animal Sciences Program (LASP) assists institutions in developing and improving animal resources for biomedical research and training through the award of research and resource grants and contracts. Program areas include support for animal colonies of unusual and special value for research; studies directed at finding animal models which are needed for research on human diseases; projects to assist institutions to comply with the legal and policy requirements for care of laboratory animals; laboratories for the diagnosis and control of diseases of laboratory animals; research related to improving health care and determining environmental requirements of animals used in research; and research training of specialists in the field of laboratory animal medicine. The Program awarded funds totaling $6.365 million in fiscal year 1979, which supported 62 discrete animal research and resource projects, eight institutional training programs, and one individual fellowship award.

ANIMAL MODELS AND SPECIAL COLONIES

The major objectives of this program area are (1) to define, characterize and exploit the relevant biological attributes of selected animals which display potential for use in several areas of biomedical research, (2) to establish, improve or expand special colonies of well characterized animals which are of proven value for biomedical research, but which are not generally available from other sources; and (3) to preserve unique and valuable stocks and strains of animals which might otherwise be lost.

Support for projects related to the establishment of special animal colonies and animal model development remained at approximately the previous year's level; i.e., FY 1978 - $2.257 million (34% of LASP budget) vs. FY 1979 - $1.832 million (29% of LASP budget). A total of 17 projects received support including two new resource grants and 10 ongoing contracts. This latter group of contracts resulted from 3 requests for proposals (RFP) issued in FY 1978. Two RFP's dealt with animal models and were intended to provide pilot support for initial characterization and definition of areas of research utility. One RFP was aimed at providing short-term support to preserve unique and valuable colonies of research animals. It was subsequently decided not to repeat these contract solicitations until the ultimate value of this approach could be demonstrated. At this point, progress reports from the animal model group indicate substantial early progress toward the objectives of each project. The projects encompass a broad spectrum of models as indicated by the following examples: neuronal aging in the vomeronasal organ of garter snakes, the squirrel monkey as a model for the effects of noise on hearing, hereditary canine spinal muscular atrophy in Brittany spaniels, and an animal model for the Guillain-Barre syndrome. The three colonies being supported under the special colony RFP are still intact, but there has been relatively little progress in obtaining stable long-range funding.

Two new grant supported resources were started in FY 1979. One at Michigan State University (MSU) involves a multidisciplinary effort to identify, characterize, and make available new animal models of human genetic diseases. Input regarding potential models will be sought from a variety of sources, including the animal clinics at MSU, veterinary practitioners, and breeding associations and clubs. This general approach has been successful in other settings as represented by three currently supported resources at Washington State University, the University of Alabama at Birmingham, and Bowman Gray School of Medicine. Other animal model projects are oriented around selected species which have potential utility as models in more than one categorical area. The second new grant award to develop techniques for culturing the sea hare, Aplysia californica, is representative of this type of activity. The sea hare is a well established model for neurophysiological and behavioral research. Declining natural populations and problems of maintaining this species have limited research utilization in the past. Development of mariculture and maintenance techniques could favor laboratory breeding over procurement from the ocean and lead to a continuous source of species wherever they were required.

Other grant related activities are primarily related to vertebrate animals including a rabbit inbred and mutant stock resource at the Jackson Laboratory; a mouse mutant gene resource also at the Jackson Laboratory; a congenic mouse resource at Sloan-Kettering Institute; and hamster resources at the University of Texas, Dallas, and Bio-Research Institute, Cambridge, Massachusetts. These and similar projects combine the maintenance and production of special strains or stocks of animals with ongoing research to further development and characterization of the models.

RESOURCE LABORATORIES

The objectives of these laboratories are to provide for improved animal health programs through investigation of naturally occurring disease and related laboratory animal problems, to support studies resulting in new information on diseases of laboratory animals and their etiology, to aid in the elucidation of new laboratory animal models of human disease, and to develop resources including tissues, slides, photographs, etc., for research and training. Most resource laboratories are institutional in nature; however, in some instances it may be desirable and feasible to serve more than one institution in a metropolitan or regional area. There are 15 programs which are currently being supported. One new laboratory was funded during FY 1979.

Resource laboratories have been a major program activity for over 10 years. There has been a continuing turnover in the institutions receiving such awards (support has been terminated for 11 laboratories). The total number has remained relatively constant (13-15) in recent years and approximately 20% of the budget is awarded in this area. Since resources and trained personnel are limited, laboratories have been limited to those settings with at least several million dollars of NIH supported research involving the use of laboratory animals. The

Animal Resources Review Committee reviewed this program area in detail during the past year, particularly regarding the issues of long term support and review criteria for research. Their recommendations were incorporated into an administrative document for applicants which spells out policy requirements and application procedures. This effort should be of considerable value in conducting future reviews and managing this program area.

Laboratory activities encompass a broad spectrum ranging from surveillance and monitoring to conduct of research on important laboratory animal disease problems. The laboratories have been productive in terms of new information and techniques. It is apparent that a multidisciplinary approach to disease problems is necessary in order to identify and isolate etiologic agents and then take appropriate steps to eliminate or control the problem. The interaction of clinicians, virologists, and pathologists was well illustrated by one resource when faced with high death losses in mouse pups born to several large groups of mice. Histologic examination revealed severe inflammation of the cecum and colon, and coronavirus antigen was detected by staining with fluoresceinated antiviral antibody. Electron microscopy revealed viral particles compatible with mouse hepatitis virus (MHV). Subsequent viral isolation was followed by experimental reproduction of the naturally occurring syndrome and reisolation of the virus. The source of infection was traced to contamination of biological material inoculated into mice in a nearby room by a scientist testing for an unrelated agent. This injected material, obtained from insects caught in local forests, was subsequently shown to contain MHV-like virus. The outbreak was controlled by depopulating and disinfecting all infected rooms and laboratories. The influence, sometimes unrecognized, of naturally occurring laboratory animal diseases on research results was particularly well illustrated at another laboratory. During a series of experiments involving the transplantation of skin across a minor histocompatibility region of the mouse, it was noted that unexpectedly prolonged graft survival was occurring in some of these skin graft recipients. Other animals were rejecting their grafts much more rapidly than expected, and still other animals died unexpectedly during the course of the experiment. The problems were presented to the resource laboratory, and an investigation revealed that most of the animals in the experiment were afflicted with Sendai virus. It was decided to investigate this problem to determine whether the Sendai virus and the unexpected results of the experiment were related. Mice free of Sendai virus were obtained, and a barrier facility was set up to prevent accidental contamination. A series of experiments was carried out to compare transplants between infected and noninfected mice. Some infected mice rejected grafts early, especially if the donor of the graft was also infected. Once the acute rejection phase had passed, those animals that failed to reject accepted their grafts for a prolonged period of time, much longer than normal. It was clearly established that intercurrent Sendai virus infections profoundly alter the results of skin transplant experiments across minor histocompatibility regions in mice. Since the mouse is an important experimental tool in the study of basic cellular

immunology, it is anticipated that these results will have a profound effect on the type of mice now deemed acceptable for use in fundamental immunologic studies. These results should markedly improve the reproducibility and value of studies in mice in which various forms of immunity are investigated by the technique of skin transplantation.

Pilot research to further characterize disease processes presented as problems to the laboratory is supported at all the laboratories. Representative of this activity are studies by two groups to isolate the etiologic agent responsible for transmissible ileal hyperplasia (TIH) in hamsters. This disease is considered by many to be the most important infectious disease of hamsters and has potential as a model for chronic inflammatory disease of the small intestine. The morphologic aspects have been well characterized but ongoing efforts have focused on identifying the causative agent. Conventional microbiologic techniques have been unsuccessful, but recent pilot work in one laboratory suggests the organism can be isolated by inoculating intestinal lining cells from infected hamsters into tissue culture cells of various types. The next step is to determine growth requirements and determine if TIH can be induced after inoculation back into hamsters. Additional funding to continue these studies will be sought, using the preliminary data supported by the resource grant. Recognition of potential animal models is an important aspect of working up problems presented to the laboratory. Recently one laboratory received a litter of rats because 4 of the 14 weanling pups had signs of neurological disease (spastic rigidity of the limbs and lack of motor control of the head). The affected rats were sacrificed for histopathological evaluation and the dam and asymptomatic rats were retained for breeding. Test matings produced additional rats with typical neurologic signs in two of three litters. Additional siblings of affected rats were secured from the commercial source to provide an adequate nucleus of breeding stock to perpetuate the disease. At this point, it appears to be an inherited disease (probably autosomal recessive) involving the vestibular system. While many neurological mutants have been described in mice, no inherited neurological disease has been reported in the rat. Thus, this discovery could be of considerable utility since the rat is commonly used for neurophysiological, neuropharmacological, and behavioral research.

RESOURCE RELATED RESEARCH

The Program has provided support to a relatively small number of discrete research projects over the past years. This activity may be summarized as follows:

	FY 75	FY 76	FY 77	FY 78	FY 79
Number of Projects	9	10	13	10	10
Awarded (in thousands)	490	462	607	457	508
Percentage of Total $	8%	8%	10%	7%	8%

Projects falling into this category generally have one of the following objectives: (1) to investigate the etiology, pathogenesis and control of laboratory animal disease problems, and (2) to determine environmental requirements of laboratory animals. For example, currently active projects include the diagnosis and control of mammalian encephalitozoonosis, developing diagnostic/control methods for canine brucellosis, updating nutrient requirements for rats, and control of respiratory mycoplasmosis in rodents. In addition, three ongoing projects are focused on population studies of nonhuman primates in countries of origin. These include census studies of rhesus monkeys in northern India, the relationship of nutrition to social behavior and utilization of living space of baboons in South Africa, and important habitat features relative to West African rain forest primates. Projects of this type are expected to provide data bearing on the conservation of monkeys in their native habitat and their future availability for biomedical research.

Support of resource related research has been accorded a very high priority by the Animal Resources Review Committee. There is widespread recognition among laboratory animal specialists and to a lesser extent among investigators using animals that naturally occurring laboratory animal diseases and environmental factors can have a significant effect on research projects. There are deficiencies in the current state of knowledge relative to many diseases, their recognition, control, etc. In recognition of the need to encourage additional research, the Committee carried out a survey in the fall of 1978 which identified a number of unresolved laboratory animal disease problems. As a next step in stimulating additional targeted research proposals, it was decided to hold several workshops dealing with selected problems in turn. The first workshop on pasteurellosis in rabbits was held March 1, 1979. It was aimed at defining the current state of the art and identification of needs and opportunities. Preliminary indications are that this approach will be successful in stimulating relevant proposals. Thus, it is anticipated that over the next several years; there will be a steady increase in the number of research projects dealing with identified priority areas.

REFERENCE CENTERS AND INFORMATION PROJECTS

The Program supports several reference centers and information projects. These include the Registry of Comparative Pathology located at the Armed Forces Institute of Pathology (consultation, publications, training and research focused on comparative pathology), a Blood Group Reference Laboratory at New York University School of Medicine (nonhuman primate blood typing), an Animal Model Reference Center at Texas A&M-Houston (sperm bank for animal models), and publication of the Laboratory Primate Newsletter. The range of activities encompassed by projects of this type is reflected by the following examples:

1. The Simian Virus Reference Laboratory at the Southwest Foundation for Research and Education, San Antonio, Texas.

The primary purposes of this laboratory are to (1) provide definitive virus diagnostic services, including identification and characterization of viruses that may be present in primate tissues; (2) develop and maintain a working repository of simian viruses and prepare reference seed virus and specific antisera to these viruses; (3) provide consultation services and encourage the pooling of information and exchange of organisms among primate centers and other health organizations; and (4) train interested students in virological laboratory procedures associated with primate investigations. During the last reporting period, a total of 4,052 serum specimens, 233 specimens for virus isolation, and 67 viruses for identification were received from 70 institutions. The Laboratory now has a working repository of over 60 virus reference reagents and reference antisera. Workshops have been held periodically for veterinarians and supervisors of nonhuman primate colonies. The topics covered range from collection and handling of specimens and current laboratory diseases to practical applications and discussions on viral diseases of primates.

2. An Immunohematological Reference Center located at Michigan State University. This reference center was established to produce, standardize and unify the resources available that recognize red blood cell groups, histocompatibility antigens, and other immunogenetic markers in the dog. The canine erythrocyte blood group system has been operational for a number of years. Efforts in the past year focused on reagent production for histocompatibility antigens. Collaboration with other investigators by providing reagents and typing services has increased and has been a major commitment of the Center. During the last reporting period, a total of 95 animals were typed for erythrocyte antigens, 75 were characterized for histocompatibility antigens, and 245 ml. of various typing sera were provided to qualified investigators.

INSTITUTIONAL ANIMAL RESOURCE IMPROVEMENTS

Institutional animal resource improvement projects are awarded to help institutions upgrade their animal facilities and develop centralized programs of animal care in support of their biomedical research programs. A major objective is to enable institutions to comply with the Animal Welfare Act and DHEW policies on the care and treatment of animals. Requests of this type usually include animal cages to meet current regulations, general sanitation equipment such as cage washers, renovation of animal facilities, and addition of trained professional and technical personnel. The projects are supported for one to three years, after which time the applicant institution is expected to take over complete financial responsibility for its basic animal resource.

Institutional improvement projects have been supported since the inception of the Laboratory Animal Sciences Program. Requests of this

type peaked in FY 1973 following implementation of the Animal Welfare Act of 1970 (P.L. 91-579) and the DHEW policy on animal welfare. Over the past seven years, 89 institutions have received improvement grants with awards totaling approximately $11.5 million. The following figures summarize activities during this period:

	FY 74	FY 75	FY 76	FY 77	FY 78	FY 79
Reviewed	19	21	19	14	21	9
Approved	12	17	9	7	13	7
New Awards	36	19	6	6	3	4
Total Active Projects	46	38	21	13	11	7
$ Awarded (in $1,000's)	3217	2582	1259	1054	793	709
Percentage of Budget	55%	42%	22%	19%	12%	11%

The above chart indicates a relative steady rate of new proposals in recent years. The largest number of program inquiries still touch on this area. The ability to fund new projects of other types and to combat inflationary costs has come largely at the expense of this program area (note steady decrease in $ awarded and percentage of budget). However, it was possible to fund 4 new proposals this year, primarily because requirements for several nonhuman primate contract activities were reduced because of income earned from the sale of animals. The Animal Resources Review Committee accorded this program area its highest priority and recommended an increased proportion of funds be allocated to institutional improvement projects. It is anticipated that data now being prepared for analysis from the "Survey of Laboratory Animal Facilities and Resources" will identify substantial needs for animal care equipment, renovations, and new construction of animal facilities. Thus, it appears that at least the present level of activity should be maintained for the next several years.

TRAINING

Training in laboratory animal medicine is intended to prepare individuals to provide professional care of the many species of laboratory animals, to manage central animal resources, and to give special assistance to investigators through knowledge of laboratory animal biology and understanding of research methods. In addition, the trainees are prepared to participate in the teaching of graduate students and young investigators and to pursue their own research interests either as independent investigators or as a member of a research team.

There are eight currently active training programs with a total of 29 funded trainee positions. In addition to the institutional programs, one individual postdoctoral fellowship was active at the end of the fiscal year. Since the usual training period takes approximately 2 1/2 years, there are usually 8-10 graduates per year. Currently available figures indicate that 148 trainees and fellows have completed training since the inception of training grants and fellowships in laboratory animal science and medicine. Forty-eight (48) of these are employed by medical schools

and 57 by other academic, research or governmental organizations. The majority (86) are serving as directors or staff members of a vivarium; 49 are engaged in research or are obtaining additional training; and 13 are in public health, private practice or are retired. Retention in the field of laboratory animal medicine has been excellent, emphasizing the career orientation provided by the training and the continuing need and opportunities available for such individuals.

For the past four years, the active training programs and diagnostic resources have been encouraged to employ veterinary students during their summer break. Eleven programs and 28 students participated this past year. Critiques of the students involved were submitted to the Branch and, in turn, distributed to all the program directors. It appears that this work experience is resulting in greater knowledge and interest in the field of laboratory animal medicine by veterinary students. Several former summer students entered formal postdoctoral programs this year and development of a "pool" of such individuals for future postdoctoral training should result in long-term benefits to the field.

ADMINISTRATION

Two areas of administrative activity have received special attention in fiscal year 1979. These areas are program evaluation and long range planning.

Two program evaluation projects were active in FY 1979. One was an evaluation of the Primate Centers Program. This evaluation was recommended by the DRR Mission Study conducted in FY 1976. The Primate Centers Program evaluation considered the number, location, size, research focus, organization, NIH policy guidelines, and general funding levels desirable for Primate Research Centers and other primate resources. The evaluation was conducted by a panel of 9 distinguished scientists and scientist-administrators. Administrative support for the panel was provided by a contractor. The panel visited each of the Primate Research Centers and surveyed other primate resources. Their final report was received early in FY 1979 and has been reviewed by DRR staff, the National Advisory Research Resources Council, and the Director of NIH.

The second evaluation project was a comprehensive survey of laboratory animal facilities and resources. This survey will provide up-to-date information on the status of our nation's animal resources for the conduct of biomedical research. The results will be basic to formulation of animal resource programs over the next decade. The survey was conducted under contract by the Institute of Laboratory Animal Resources, NRC/NAS. The survey questionnaire encompassed the areas of animal resource costs, administration and personnel, facilities and equipment, and animal sources and use. The survey returns are now being analyzed and a final report is expected by December 31, 1979.

The second major administrative activity was drafting of a long range plan for animal resources. This is part of an overall DRR planning effort. The recommendations of the Primate Centers Evaluation Panel mentioned above are serving as an important input to the plan. The plan will propose better research support for primate center core staff, but a reduction in numbers of core staff, closer Primate Center-host institution relationship, increased primate breeding, and increased research and training in laboratory animal medicine, to mention just a few of the plan's elements.

Table I - Primate Research Centers Program Applications - FY 1979

Type	Number Received	Amount Requested[1]	Number Approved	Amount Approved[1]	Number Funded	Amount Funded[2]
New	-	--	-	--	-	--
Renewal	-	--	-	--	-	--
Supplemental	-	--	-	--	-	--
Continuation	7	16,862,504	7	15,998,739	7	15,259,669
Totals	7	16,862,504	7	15,998,739	7	15,259,669

1/ Direct Costs Only
2/ Includes Indirect Costs ($2,007,599)

Table II - Laboratory Animal Science and Other Primate Resource and Research Grant Applications - FY 1979

Type	Number Received	Amount Requested[1]	Number Approved	Amount Approved[1]	Number Funded	Amount Funded[2]
New	34	2,884,216	25	1,870,400	9	968,496
Renewal	9	751,876	6	432,709	6	618,568[3]
Supplemental	1	11,960	1	11,960	5	194,465[4]
Continuation	42	4,295,793	42	3,281,977	42	4,584,418
Totals	86	7,943,845	74	5,597,046	62	6,365,947

1/ Direct Costs Only
2/ Includes Indirect Costs ($1,708,240)
3/ Includes 1 Prior Year Approval
4/ Includes 4 Administrative Interim Actions

Table III - National Research Service Awards Program - Institutional - FY 1979

Type	Number Received	Amount Requested[1]	Number Approved	Amount Approved[1]	Number Funded	Amount Funded[2]
New	1	41,081	-	--	-	--
Renewal	-	--	-	--	-	--
Supplemental	1	31,389	1	31,389	-	--
Continuation	8	678,609	8	617,226	8	498,400
Totals	10	751,079	9	648,615	8	498,400

1/ Direct Costs Only
2/ Includes Indirect Costs ($31,551)

Table IV - National Research Service Awards Program - Individual - FY 1979

Type	Number Received	Number Approved	Number Funded	Amount Funded
New	2	1	-	--
Renewal	-	-	-	--
Supplemental	-	-	-	--
Continuation	2	2	1	16,600
Totals	4	3	1	16,600

Table V - Laboratory Animal Science and Other Primate Resource and Research Grants - Project Type - FY 1979

Type	Number Received	Amount Requested[1/]	Number Approved	Amount Approved[1/]	Number Funded	Amount Funded[2/]
Resource Research	25	1,211,137	17	660,340	10	508,824
Primate Resource	5	499,341	4	220,103	4	335,612
Special Colonies and Models	20	1,915,998	19	1,418,288	17	1,832,883
Basic Improvement	12	1,583,530	11	1,222,914	7	709,143
Diagnostic Labs.	16	1,929,064	15	1,469,041	15	1,951,926[3/]
Animal Reference	7	779,775	7	581,360	8	990,763[4/]
Research Career	1	25,000	1	25,000	1	36,796
Totals	86	7,943,845	74	5,597,046	62	6,365,947

1/ Direct Costs Only
2/ Includes Indirect Costs ($1,708,240)
3/ Includes 4 Administrative Interim Actions
4/ Includes 1 Prior Year Approval

Table VI - Laboratory Animal Science and Other Primate Resource Contracts

	Number Supported	Amount Funded
Special Colonies and Models	10	368,113
Primate Resources	1	474,180
Primate Supply	5	493,519
Program Support	3	159,572
Totals	19	1,495,384

Fiscal Year 1979 Annual Report
Biotechnology Resources Program
Division of Research Resources

Table of Contents

Introduction . . . . . .

Expenditures by Category . . . . . .

Program Developments . . . . . .

Meetings, Workshops, Conferences . . . . . .

Contracts . . . . . .

INTRODUCTION

The Biotechnology Resources Program (BRP) was established in 1962 as the Special Research Resources Branch of the Division of Research Facilities and Resources to provide support for complex technological capabilities required in biomedical research. The Program has an array of diverse resources, all designed to meet one or more specific technological needs of biomedical research scientists.

Emphasis at present is in resources for computer science applications in biomedicine, biomedical engineering and specialized instrumentation for study of biological structure and function which includes mass spectrometry, nuclear magnetic resonance, electron spin resonance, electron microscopy, electron microanalysis, x-ray diffraction, and biomedical kinetics. As new advanced technological tools become pertinent to health research, the Program makes these tools available to the biomedical research community.

Current senior staff members are:

Dr. Suzanne S. Stimler, Director;

Dr. William Roy Baker, Jr., Special Assistant for Biomedical Engineering;

Dr. Charles L. Coulter, Head Biological Structure Section;

Dr. Jack Hahn, Head, Computer Technology Section;

Mr. John White, Office of Grants and Contracts Management, serves as Supervisory Grants Management Specialist and Ms. Delma Ellstrom serves as Grants Management Specialist for the Program.

EXPENDITURES BY CATEGORY

Types of Biotechnology Resources

The Program supported resource grants, resource-related research project grants and contracts during FY 1979. The varied technologies the Biotechnology Resources provide are classified as follows:

Type	Number (Grants & Contr.)	$ Awarded FY 1979
Computer		
Information and Knowledge Systems	8	4,143,672
Computer Science and Technology	10	4,353,151
Biomedical Engineering	2	832,394
Biological Structure and Function		
Mass Spectrometry	6	1,044,383
Nuclear Magnetic Resonance	11	1,207,028
Diffraction	1	339,483
Electron Spin Resonance	1	173,450
Biomedical Kinetics	1	333,056
Electron Microscopy	4	882,303
Electron Microprobe	1	413,540
Cellular and Biochemical Materials	2	521,661

The aggregate annual level for the grant and contract activities is approximately $14.5 million. A list by Program category of BRP-sponsored grants and contracts is given in Table I, together with brief descriptions of the capabilities and research emphasis or applications for each.

Table II gives information on resource grant applications by type and Program category for FY 1979. Numbers of grants submitted, amounts requested, numbers of grants approved, funded, and amounts funded are provided in Table II.

TABLE I

BRP-Funded Grants and Contracts During FY 1979
As of September 1, 1979

Number	Principal Investigator and Institution	Title	Capability	Research Emphasis or Applications	FY 1979 $ Award	Cumulative $ Awards
			Computer Resources			
Information and Knowledge Systems						
5R24-RR612-10	Carl Djerassi, Ph.D. Stanford Univ. Stanford, Ca.	Resource-Related Research: Computers and Chemistry	Computer software for interpretation of mass spectrometry data	Development of techniques for computer-assisted molecular structure elucidation	227,601	2,944,619
5P41-RR-643-08	Saul Amarel, Sc.D. Rutgers Univ. New Brunswick, N.J.	Special Research Resource: Computers in Biomedicine	Access to time-sharing systems	Application of artificial intelligence to clinical decision making and medical modeling	675,986	3,382,041
3P41-RR-785-06S1 5P41-RR-785-07	Edward A. Feigenbaum, Ph.D. Stanford Univ. Stanford, Ca.	S U Medical Experimental Computer Resource	Remote access through computer networka	Biomedical research applications of artificial intelligence and computer sharing for health research	186,375 954,111	5,847,640
5R24-RR-1059-03	Todd Wipke, Ph.D. Univ. of Ca. Santa Cruz, Ca.	Resource-related Research: Biomolecular Synthesis	Application of computers to synthetic organic chemistry	Computerized evaluation of chemical synthesis choices	89,629	280,880
5P41-RR-1096-03	Peter Szolovits, Ph.D. Mass. Inst. of Tech. Cambridge, Mass.	Laboratory for Clinical Decision Making	Computer-based clinical decision systems	Artificial intelligence applications to clinical decision systems	153,814	483,589

5R24-RR-1101-03	Harry E. Pople, Ph.D. University of Pittsburgh Pittsburgh, Pa.	Clinical Decision Systems Research Resource	Computer-based diagnostic consultation systems	Artificial intelligence methodology for clinical decision systems	158,156	562,339
NO1-RR-9-2107	ADP Network Services, Inc. Waltham, Mass.	Hardware Maintenance Contract in Support of PROPHET System	PROPHET Timesharing Computer Resource	Chemical/Biological Information Handling	1,010,436	1,010,436
NO1-RR-8-2118	Bolt, Beranek and Newman, Inc. Cambridge, Mass.	Software Development Maintenance and Technical Assistance for PROPHET System	PROPHET Timesharing Computer Resource	Chemical/Biological Information Handling	687,564	6,618,454
Computer Science and Technology						
5R24-RR-7-16	Richard A. Robb, Ph.D. Mayo Foundation Rochester, Minn.	Computer Analyses of Biosystem Structures and Functions	Image Processing and Analysis	X-ray, ultrasound and non-invasive monitoring of radionuclide imaging of major organs of the body	341,754	6,599,810
3P41-RR-276-13S2 1/	Ivan R. Neilsen, Ph.D. Loma Linda Univ. Loma Linda, Ca.	Development of Biomedical Computation Facility	Dedicated systems and time-sharing on-line grsphics	Biomedical modeling, computer-assisted pulmonary function testing, EKG analysis	178,160	1,995,438
5P41-RR-374-13	Theodore H. Kehl, Ph.D. Univ. of Wash. Seattle, Wash.	Support for Physiology and Biophysics Computer	BASIL computer system	Computer support to on-line control and analysis of physiology and biophysics	262,408	2,328,384
5P41-RR-396-12	Jerome R. Cox, Jr., Sc.D. Wash. Univ. St. Louis, Mo.	A Resource for Biomedical Computing	Dedicated computers and macromodule systems	Information system technology cardiac rhythm monitoring, biomolecular modeling, positron-emission tomography	2,087,389	18,554,783
2P41-RR-442-11	Cyrus Levinthal, Ph.D. Columbia Univ. N.Y., N.Y.	Computer Resource for Image Processing and Displays	Image processing and interactive graphics	Neuro-anatomical modeling, biomolecular modeling	223,910	3,130,657
5P41-RR-757-07	Joseph Kraut, Ph.D. Univ. of Ca. La Jolla, Ca.	Computer Resource for Biomolecular Research	Computer-based automated laboratory systems	Biomolecular modeling, on-line acquisition of x-ray crystallographic data	372,817	1,624,861

3P41-RR-898-05S1 3P41-RR-898-05S2	Frederick Brooks, Ph.D. Univ. of N.C. Chapel Hill, N.C.	Regional Graphics Resource for Molecular Studies	Interactive Computer Graphics	Biomolecular modeling of proteins and nucleic acids	78,823 94,261	672,394
3P41-RR-1081-02S2* 1/	Robert Langridge, Ph.D. School of Pharm., U. Ca. San Francisco, Ca.	Special Research Resources for Biomolecular Graphics	Stand alone medium computer and graphics	Biomolecular modeling	164,237	1,658,422
5P41-RR-1089-03	Robert Schoenfeld D.E.E. Rockefeller Univ. N.Y., N.Y.	A Microprocessor Biotechnology Resource	Application of microprocessor-based instruments to biology	Development of microprocessor-based systems for biological research	109,992	366,264
N01-RR-8-2107**	Wilfrid J. Dixon, Ph.D. Univ. of Ca. Los Angeles, Ca.	Continued Support of the BMD/BMDP Program	Maintenance, continued development distribution BMD/BMDP statistical packages	Computer packages for biomedical research	439,400	23,807,591
			Biomedical Engineering			
5P41-RR-857-05	Wen H. Ko, Ph.D. Case Western Reserve Univ. Cleveland, Ohio	Biomedical Electronics Resource	Microelectronics fabrication, packaging and evaluation	Micro-electrodes, solid state physical and gaseous sensors, implant telemetry	695,687	2,411,750
5P41-RR-1086-03	James B. Angell, Sc.D. Stanford Univ. Stanford, Ca.	Resource for Silicon Biomedical Tranducers	Microelectronics and micromaching of sensors	Biomedical tranducers for clinical research	136,707	763,805
			Biological Structure and Function			
Mass Spectrometry (MS) Note: GC refers to Gas Chromatography						
2P41-RR-317-13	Klaus Biemann, Ph.D. M.I.T. Cambridge, Mass.	Mass Spectrometry Facility for Biomedical Research	High resolution MS, GC/medium resolution MS	Drug identification, drug metabolism, molecular structure analysis	377,019	2,959,256
5P41-RR-480-11	Charles C. Sweeley, Ph.D. Michigan State Univ. East Lansing, Mich.	Mass Spectrometry Facility	High resolution MS; GC/MS; field desorption MS	Metabolites in biological fluids, structure determination of lipids, analysis of complex mixtures	159,175	1,313,486

5P41-RR-719-05	A.L. Burlingame, Ph.D. Univ. of Ca. Berkeley, Ca.	Bio-Organic Biomedical Mass Spectrometry Resource	GC/low and high resolution MS	Toxic chemical metabolites, urinary organic acids, high resolution MS data from chromatographic effluents	297,267	1,329,015
5P41-RR-862-06	Frank H. Field, Ph.D. Rockefeller Univ. N.Y., N.Y.	A Mass Spectrometric Biotechnology Resource	Low and high resolution MS, GC/chemical ionization quadrupole MS	Fission fragment MS; drug metabolism, drug assays, peptide sequencing	101,454	719,551
5P41-RR-922-03	Heinz G. Boettger, M.S. Ca. Inst. of Tech. Pasadena, Ca.	Mass Spec. Resource for Biomedical Applications	Mass Spectrometry	Multiple ion monitoring	74,454	188,190
3P41-RR-954-03S2 1/	William F. Holmes, Ph.D. Washington Univ. St. Louis, Mo.	A Resource for Biomedical Mass Spectrometry	GC/low resolution MS; chemical ionization	Drug and vitamin metabolism; inborn metabolic errors	35,014	943,733
Nuclear Magnetic Resonance						
5P41-RR-292-14	Aksel A. Bothner-By, Ph.D. Mellon-Pittsburgh Carnegie Corp. Pittsburgh, Pa.	NMR Facility for Biomedical Studies	250 MHz NMR Spectrometer	Structure and function of hemoglobins, biological membranes, proteins	147,847	1,939,673
5P41-RR-542-09	George McDonald, Ph.D. Univ. of Pa. Philadelphia, Pa.	Middle Atlantic Regional NMR Facility	220 MHz, NMR Spectrometer; 360 MHz, NMR Spectrometer	Enzyme/substrate interaction mechanisms; RNA structure	114,378	1,505,511
3P41-RR-574-08S1 1/	David M. Grant, Ph.D. Univ. of Utah Salt Lake City, Utah	Regional Research Facility in NMR	100 MHz NMR spectrometers; 300 MHz NMR spectrometer	^{13}C labelled macromolecules; ^{15}N-^{13}C coupling constants of depeptides	146,406	1,513,868
3P41-RR-639-05S1 1/	Jay A. Glasel, Ph.D. Univ. of Conn. Hartford, Conn.	A New England Area NMR Research Resource	100 MHz NMR spectrometer	Structure and function of Peptides and Hormones	67,037	490,312

5P41-RR-708-05	Nathan O. Kaplan, Ph.D. Univ. of Ca. La Jolla, Ca.	UCSD Resource Facility for NMR and Mass Spectrometry	220 MHz NMR spectrometer; CFT-20 spectrometers; GC/low resolution MS	Structure/function relationships of peptide hormones	145,884	830,981
2P41-RR-711-07	Oleg Jardetzky, M.D. Stanford Univ. Stanford, Ca.	High Frequency NMR Biotechnology Resource	360 MHz NMR spectrometer	Conformational changes on the lac-repressor proteins, membrane immuno chemistry enzyme-substrate complexes	228,784	1,178,043
3P41-RR-798-05S1 1/	James H. Prestegard, Ph.D. Yale Univ. New Haven, Conn.	Southern New England High Field NMR Facility	270 MHz NMR spectrometer	Structure of biological membranes, drug and hormones action, protein structures	31,080	571,738
5P41-RR-892-04	Thomas L. James, Ph.D. Univ. of Ca. San Francisco, Ca.	NMR Spectroscopy Resource	100 MHz NMR spectrometer	Lipid mobility in membranes enzyme mechanisms	53,996	400,982
3P41-RR-995-03S1 2P41-RR-995-04	Leo J. Neuringer, Ph.D. M.I.T. Cambridge, Mass.	A National NMR Facility for Biomedical Research	270 MHz NMR spectrometer; 290 MHz NMR spectrometer for studies of solids	Model membrane systems; lipid-protein interactions	60,006 17,000	603,827
5P41-RR-1039-03	Paul C. Lauturbur, Ph.D. Research Found. of SUNY, L.I., N.Y.	Facility for Biomedical NMR on Radioactive Samples	100 MHz NMR Spectrometer	3_H Labelled Compounds	74,979	252,470
5P41-RR-1077-03	John H. Markley, Ph.D. Purdue Univ. West Lafayette, Ind.	A Regional NMR Resource for Biomolecular Research	360 MHz NMR spectrometer	Macromolecular structure studies	119,631	849,275
Diffraction						
3P41-RR-1135-01S1 5P41-RR-1135-02	Robert H. Kretsinger, Ph.D. Univ. of Va. Charlottesville, Va.	Development of an Area X-ray Diffractometer	A multiwire detector provides the basis for rapid x-ray data collection	Emphasis will be on data collection for protein crystals	82,984 256,499	375,242

Electron Spin Resonance (ESR)

3P41-RR-1008-03S1 2P41-RR-1008-04	Harold M. Swartz, M.D., Ph.D. Medical College of Wis. Milwaukee, Wis.	Biomedical ESR Spectroscopy Center	ENDOR, ELDOR Pulse ESR Spectrometers	Clinical applications of ESR, structure of free radicals in biological materials, enzyme kinetics; paramagnetic changes during tumor development	168,950 4,500	1,035,554

Biomedical Kinetics

3P41-RR-886-04S1 5P41-RR-886-05	Edward L. Powers, Ph.D. Univ. of Texas Austin, Texas	Center for Fast Kinetics Research	Electron Pulse 5.5 MeV Van de Graff accelerator for radiolysis studies	Reactions of DNA and OH radicals; dose rate effects in irradiated cells	111,264 221,792	1,091,435

Electron Microscopy

5P41-RR-570-09	Hans Ris, Ph.D. Univ. of Wis. Madison, Wis.	Electron Microscope Facility for Biomedical Research	1 MeV electron microscope	3-D structure of chromosomes, neuronal tissues, frozen tissues	124,745	1,491,714
5P41-RR-592-10	Keith R. Porter, Ph.D. Univ. of Colo. Boulder, Colo.	High Voltage Electron Microscopy of Biological Systems	1 MeV electron microscope	3-D structure of whole-cultured cells, intracellular systems; isolated mitotic apparatus	319,990	3,359,482
2P41-RR-715-07	Joseph S. Wall, Ph.D. Assoc. Universities, Inc. Upton, New York	Electron Microscope Facility	100 KV scanning transmission electron microscope	Viruses, nucleic acids, membranes	259,907	1,254,725
5P41-RR-984-04	Albert V. Crewe, Ph.D. Univ. of Chicago Chicago, Ill.	Scanning Microscope Laboratory for General Faculty Use	40 KV Scanning Transmission Electron Microscope, Hitachi SEM, Coates-Welter SEM	Atomic resolution of single heavy atoms in biological materials	177,661	850,874

Electron Microprobe

5P41-RR-679-08	Claude P. Lechene, M.D. Harvard Medical School Boston, Mass.	Biotechnology Resource in Electronprobe Microanalysis	CAMECA electron microanalyzer	Elemental composition of biological tissues	413,540	2,400,293
			Cellular and Biochemical Materials			
3P41-RR-961-03S2	Donald A. Glaser, Ph.D. Univ. of Ca. Berkeley, Ca.	Facility for Automated Experiments in Cell Biology	Large-scale production of mutant cells	Mutants of microbial and animal cell cultures	350,000	4,337,208
5P41-RR-962-04	Nicholas A. Matwiyoff, Ph.D. Univ. of Ca. Los Alamos, N. Mex.	A National Stable Isotope Resource at Los Alamos	Provision of labelled compounds with stable isotopes of C, O, and N for biological research	Syntheses of labelled compounds with stable isotopes	171,661	737,404

* Includes grant support through fifth year of previous grant (2P07-RR-00578-05A1)

** Includes grant support through sixteenth year (2P41-RR-0003-16A1)

1/ Phase-out awards

TABLE II

Biotechnology Resource Grant Applications -- FY 1979

Type	Number Reviewed* FY 79	Amount Requested (Direct)	Number Approved FY 79	Amount Approved (Direct)	Number Funded	Amount Funded		
						Direct	Indirect	Total
Computer								
New	4	2,815,026	2	659,621	0	0	0	0
Renewal	4	1,466,588	4	1,011,711	1	165,024	58,886	223,910
Supplemental (Competing)	1	54,448	1	54,448	0	0	0	0
Supplemental (Interim)	5	557,043	5	557,043	5	557,043	144,813	701,856
Continuation	11	6,715,504	11	4,384,534	11	3,650,530	783,127	5,433,657
Totals	25	11,608,609	23	6,667,357	17	4,372,597	1,986,826	6,359,423
Biomedical Engineering								
New	1	204,478	1	204,478	0	0	0	0
Renewal	0	0	0	0	0	0	0	0
Supplemental (Competing)	0	0	0	0	0	0	0	0
Supplemental (Interim)	0	0	0	0	0	0	0	0
Continuation	2	667,545	2	680,224	2	484,694	347,700	832,394
Totals	3	872,023	3	884,702	2	484,694	347,700	832,394
Biological Structure and Function								
New	12	3,689,468	7	1,804,624	0	0	0	0
Renewal	10	2,118,783	10	1,697,768	5	622,692	264,518	887,210
Supplemental (Competing)	0	0	0	0	0	0	0	0
Supplemental (Interim)	8	496,070	8	479,070	8	479,070	223,671	702,741
Continuation	16	2,387,508	16	1,988,364	16	1,968,648	834,644	2,803,292
Totals	46	8,691,829	41	5,969,826	29	3,070,410	1,322,833	4,393,243

Type	Number Reviewed* FY 79	Amount Requested (Direct)	Number Approved FY 79	Amount Approved (Direct)	Number Funded	Amount Funded		
						Direct	Indirect	Total
Cellular and Biochemical Materials								
New	0	0	0	0	0	0	0	0
Renewal	1	293,251	1	223,103	0	0	0	0
Supplemental (Competing)	0	0	0	0	0	0	0	0
Supplemental (Interim)	2	267,176	1	267,176	2	267,176	82,824	350,000
Continuation	1	866,000	1	121,331	1	115,830	55,831	171,661
Totals	4	1,426,427	3	611,610	3	383,006	138,655	521,661
GRAND TOTALS	78	22,598,888	70	14,133,495	51	8,310,707	3,796,014	12,106,721

*New, Renewal, and Competing Supplemental applications reviewed at September 1978, February 1979 and May 1979 Councils

PROGRAM DEVELOPMENTS

Resource Directory

The Research Resources Directory for Biotechnology Resources continues to be in constant demand. The Directory first issued in May 1977, revised in August 1978, is being revised again in 1979. The latest edition will contain a general description of the resources' technologies and scientific capabilities written in language understandable by scientists not knowledgeable in uses of the specialized technologies offered by the Program.

Exhibit

An exhibit featuring the Resource Directory of biotechnology resources was shown at annual meetings of Federation of Associated Societies in Experimental Biology (FASEB) in April 1979, and Electron Microscopy Society of America and Microbeam Analyses Society in August 1979. The exhibit was well attended at both meetings. Over 500 copies of the Directory were distributed at the FASEB meeting.

Resource Accomplishments

The Research Resources Reporter, published monthly under DRR contract with Tracor Jitco, Inc., contained 14 articles this past year on various facets of the Biotechnology Resource Program-sponsored activities. Research accomplishments were featured in articles on: a bioautofuel cell which transforms energy of biochemical reactions occurring in the body to electricity to power microelectronic implanted devices for blood pressure, EEG and glucose monitoring in the body developed at the Biomedical Electronics Resource, Case Western Reserve University (May 1979); a dynamic spacial reconstructor imaging device for real time displays in three dimensions of the heart, lungs and circulatory system developed at the Mayo Foundation (January 1979); a new technique for medical imaging, zeugmatography, which uses a magnetic field and radio waves to produce images of internal tissues and organs developed in part at the Facility for Biomedical NMR on Radioactive Samples, SUNY, Long Island, New York (January 1979); use of the Computer Facility for Real Time Data Acquisition and Display at the University of California, San Diego for studying the structure of gene products induced by cancer-causing viruses in rats (March 1979); a computerized genetic counseling system at the M.I.T. Resource for Clinical Decision Making (February 1979); production of the first large volumes of nearly pure Carbon-13 isotope for use in pharmacological research at the National Stable Isotope Resource at Los Alamos (November 1978); detection of Vitamin B-12 deficiency in a six-month old child using the Resource for Mass Spectrometry, University of California, San Diego (April 1979); and confirmation of the structure of fibrinogen, a protein essential to blood clotting, at the Scanning Transmission Electron Microscope Facility, Brookhaven National Laboratories (July 1979). Special articles about capabilities offered at resources were on the Resource for Silcon Biomedical Transducers, Stanford

University and the Biomedical Electronics Resource, Case Western Reserve University (December 1978); Computer Graphics Resource for Molecular Structure Studies, University of North Carolina (March 1979); Regional NMR Resource for Biomolecular Research, Purdue University (January 1979); applications of NMR to biomedical research at the NMR Facility for Biomedical Studies (January 1979); application of mass spectrometry to biomedical research at the Michigan State University Mass Spectrometer Facility (April 1979); and the Scanning Transmission Electron Microscope Resource at Brookhaven National Laboratory (October 1978). A special edition published in September 1979 on the Stanford University Medical Experimental Computer SUMEX-Artificial Intelligence in Medicine (AIM) Resource gave detailed information on the unique capabilities of this resource and the projects being conducted that use the resource. The New York Times in May 22, 1979, reported on a computer model describing the disorder paranoia which was developed in the SUMEX-AIM resource.

Budget

The most serious problem facing the Program is its inability to fund meritorious resource grant applications. The budget in "real" dollars has been level since 1974. When the budget is adjusted for inflation to give constant dollars, the Program's budget has shown a net decrease over the past decade. Budget figures from 1969 to 1979 for the Program are given in Table III. Since 1969 the Program has decreased 40 percent in constant dollars or in its ability to purchase research and equipment. In contrast, the total NIH budget has increased in constant dollars by 47 percent from 1969 to 1979 (Basic Data Relating to the NIH, 1979).

Type 5 applications have higher budgets over the past year's support because of increases in salaries and indirect costs both due to inflation. Type 2 applications have in addition to these increases, requests to replace or update obsolete equipment and increases from higher costs of supplies and equipment maintenance. The Program receives requests for major replacements or updates in most renewal applications because lifetimes for technology to stay at the leading edge of the technology's state-of-art range from 5 to 10 years.

To keep within the BRP FY 1979 budget, it was necessary to phase out six competing renewal resource grants. No new grants were awarded this year. There are 19 approved, unfunded grant applications (Type 1 and Type 3) requesting $5,604,890 from BRP. These will be kept administratively active and considered for funding in 1980.

TABLE III

Past Decade Appropriations
Biotechnology Resources Program (BRP)
Chemical/Biological Information-Handling Program (CBIHP)

Year	BRP in $1,000	CBIHP in $1,000	Total	NIH R&D Price Deflator [a]	Budget in Constant $ in $1,000
1969	11,020	1,050	12,070	100	12,070
1970	11,003	1,050	12,053		
1971	10,007	1,000	11,007		
1972	11,113	1,060	12,173		
1973	11,068	1,005	12,073		
1974	13,406	1,000	14,400		
1975	12,165	1,000	13,165		
1976[b]	12,353	1,000	13,353		
1977	13,013	1,090	14,103		
1978	13,018	1,164	14,182		
1979	13,018	1,164	14,182	195.7	7,247

[a] Basic Data Relating to National Institutes of Health, 1979

[b] Does not include transition quarter funds

Support of NIH Categorical Institutes

One of the primary measures of accomplishment that can be applied to the Biotechnology Resources Program is the extent to which its sponsored resources assist the various NIH categorical programs. With their cadres of highly skilled staff scientists and their specialized and often unique facilities, Biotechnology Resources are frequently the scene of productive encounters between experts in a given technology and experts in a given medical discipline. Table IV gives additional insight into the breadth and depth of this Program on the health research supported by the DHEW.

Table IV lists the number of projects that made use of the Biotechnology Resources and the value of these projects in thousands of dollars of grant support for these projects. The data is presented for the NIH Institutes and some of the other Public Health Service Administrations. The distribution of research assisted by the Biotechnology Program reflects in part how apportionment of research funds to the NIH Institutes and other agencies brings research talent to a given area and how the staff of the Biotechnology Resources respond in meeting these demands.

The data in Table IV was obtained from progress reports submitted in 1978 and analyzed by the Office of Program Analysis, DRR. Similar information was not collected and analyzed using comparable data from 1979 progress reports. However, since there has been little change in the Program the past several years, the data in Table IV gives a good approximation of the usage of Biotechnology Resources by different Institutes in 1978.

TABLE IV

Number and Dollar Amount by NIH Institute and PHS Administrations of Projects Receiving Biotechnology Resource Support From 43 Out of 48 Resources

Active During FY 1977

NIH Institute	Number of Projects	Dollar Value of Projects in $1,000
Allergy and Infectious Diseases	30	1,595
Arthritis, Metabolism and Digestive Diseases	74	6,026
Cancer	148	16,826
Child Health and Human Development	46	6,487
Dental Research	9	346
Environmental Health Sciences	11	1,516
Eye	26	1,974
General Medical Sciences	174	10,595
Heart and Lung	85	10,615
Neurological and Communicative Disorders and Stroke	55	6,177
National Library of Medicine	5	357
Total	663	62,514
Other PHS Administration Components:		
Alcohol, Drug Abuse and Mental Health Administration	65	7,539
Food and Drug Administration	9	424
Health Resources Administration	54	4,372
Grand Total	791	74,849

MEETINGS, WORKSHOPS, CONFERENCES

Biotechnology Resources Review Committee

The Biotechnology Resources Review Committee has developed over the past year a series of reports which set forth needs, opportunities, scientific directions, and priorities for the Program. These reports provide a basis for planning and new initiatives both in the short term through the NIH Forward Plan, and in the long term through the Five-Year Plan. The Committee expects to have presentations from several Resources in the coming year to further educate the Committee on the nature of Biotechnology Resources and on the technical and administrative problems and opportunities which Program Directors face. Committee meetings are held at least twice a year and are open to the public except when confidential materials and prospectuses are being reviewed.

Biomedical Engineering

A Workshop sponsored jointly by the resources in biomedical engineering at Stanford and Case Western Reserve University and the Biotechnology Resources Program was conducted at Stanford University on June 27-29, 1979. This Workshop on Implantable Micro-Transducers and Systems; Packaging Methods and Testing Criteria was designed to examine the problems of long-term reliability of implanted electronic systems. Emphasis was on exchange of information between experts in discovery, development, clinical testing, and quality assurance of implanted microsystems. The goal was to identify problems in reliability, and to define solutions to these problems. A digest of this Workshop is available from Dr. James B. Angell, Department of Electrical Engineering, Stanford University, Stanford, California 94305.

A Workshop on Hearing Loss was held at NIH on August 7-8, 1979, sponsored by NIA, NINCDS, the resource at Case Western Reserve University, and the Biotechnology Resources Program. The first session dealt with the knowledge recently incorporated in what is known about the many manifestations of hearing loss. The second session addressed what can be accomplished through the advances in technology and biomedical engineering that was not available in the past to ameliorate hearing problems.

Artificial Intelligence

Medicine

A small workshop was held May 17-20, 1979, by the Laboratory for Clinical Decision Making, M.I.T. The workshop was concerned with technical computer science issues of the representation of medical knowledge, explanation and justification, knowledge base acquisition and maintenance, and the detailed computational mechanisms in INTERNIST II. Consideration was also given to current and future difficulties of bringing the artificial intelligence in medicine programs to clinical use.

Biochemistry

In December 1978 three, 3-day workshops were held at Stanford University to introduce experts in the field of biomolecular structure elucidation to the first version of the exportable version of CONGEN. CONGEN is a series of interactive computer programs which assists scientists to explore potential structures of unknown compounds. The programs draw structural conclusions from physical and chemical data.

NMR Conference

A Symposium to dedicate the Regional NMR Resource for Biomolecular Research at Purdue University was held November 17-18, 1978. Emphasis was on use of NMR to study glycoproteins, protein dynamics, conformation of mobil peptides, tRNA, biological membranes, and the red blood cell.

CONTRACTS

PROPHET Computer System

A. Introduction

The PROPHET computer system provides the biomedical research community with the most comprehensive set of tools currently available on any single system for data management, graphical and statistical analysis, curve fitting/mathematical and molecular modeling. The computer-naive scientist easily utilizes the system via English language-like commands. Ease of use is facilitated by the availability of (1) extensive and frequently updated manuals; (2) a 24-hour telephone hot line; and (3) an on-line message system. The more computer-sophisticated user can write his own programs in PL-PROPHET, a versatile programming language available on the system. Existing software programs are continually reevaluated and updated. New programs are designed by the software development and user assistance staff at Bolt, Beranek and Newman in response to user needs established through several mechanisms, including frequent visits to each user site, an annual users colloquium, and the PROPHET telephone line.

B. The User Community Served

There are approximately 275 scientists utilizing PROPHET tools at 19 PROPHET user sites. These scientists conduct more than 300 projects supported by over 250 grants from government and private granting agencies.

C. New PROPHET Sites

During FY 1979, three new sites were added to the system:

1. The Chemistry Department at Louisiana State University in Baton Rouge, Louisiana;

2. The Biology Department and other allied sciences at Yale University, New Haven, Connecticut (upgraded from a teletype site);

3. The Wellcome Research Laboratories of the Burroughs Wellcome Company, Research Triangle Park, North Carolina.

D. New PROPHET Tools

1. The molecule data type was completely redesigned. This was done in response to a growing need of the user community to access substructures in order to develop more sophisticated programs dealing with molecules. The redesign makes it feasible for more complicated substructure search and structure-activity types of investigations to be undertaken in PROPHET.

2. In an additional attempt to meet the needs of the PROPHET molecular community, a disk-based molecule capability was introduced. Normally, a molecule is entirely contained in core memory and is consequently limited in size. This had been satisfactory for a number of years, but users increasingly express their need to work with much larger molecules (e.g., proteins). The disk-based molecule capability was introduced to meet this need. In it, most of the information about the molecule is stored on disk-based table files, thus freeing molecules from the limits of core memory size.

3. In conjuction with the new molecule design, a battery of new vector and matrix routines was introduced to speed up the three-dimensional transformations needed to display and manipulate molecular representations. In addition, many of the vector and matrix routines were incorporated in PROPHET's statistical procedures for another increase in efficiency.

4. A major extension was made in PROPHET's curve-fitting capabilities. Procedures were developed to interface PROPHET with MLAB (Modeling Laboratory Program developed at DCRT, NIH) to fit series of differential equations and to extend greatly the complexity of functions which can be fitted from PROPHET.

5. New statistical procedures were added to PROPHET's repertory. These include: Friedman's multiple comparison test; Dunnet's multiple comparison test; and Bartlett's variance test.

6. A major extension was made in the ability to select portions of a table--both in displaying a table, or in making a new table from pieces of another. This new language capability makes the table syntax completely flexible to the user and greatly simplifies what the user needs to do in order to select portions of a table.

7. An interface was developed to the CELLSIM Cell Kinetics Modeling Program. This Program had been requested by several PROPHET users as the best Program available for the simulation of normal and cancerous cell growth.

E. Major Projects

1. Molecular Basis of Antibody Specificity and Its Genetic Control

Dr. E. A. Kabat of Columbia University and NCI and Dr. T. T. Wu of Northwestern University have been using the PROPHET system for approximately five years in support of their collaborative research. Their joint investigations are designed to elucidate the molecular basis of antibody specificity and its genetic control. Thus, the work is relevant to essentially any area of biology and medicine where an organism's immune system may play a role in combating (or, in some cases, causing) disease or dysfunction. Among the questions these investigators are concerned with are the following:

a. What structural features enable antibodies to be so incredibly specific in their associations with antigens?

b. What significance should be attributed to the fact that all immunoglobulin molecules have many structural features in common, irrespective of the antigen against which they are directed or the animal species from which they are obtained?

c. What are the implications of our understanding of antibody structure on the behavior of genetic material?

d. In view of the absence of detailed x-ray crystallographic findings of the three-dimensional structure of immunoglobulin molecules, to what extent can one use knowledge of the primary structure of these proteins (i.e., the linear sequence of amino acids which comprise the polypeptide chains) to make predictions about an antibody's molecular conformation?

In support of their research these investigators have created a unique collection of data relating to the amino acid sequences of the immunoglobulins and their activity. This data base has proven so unique that it is published and distributed worldwide. The collection contains virtually all published sequences of immunoglobulins.

2. NICHD Contraceptive Studies

The Contraceptive Development Branch of the NICHD is currently using PROPHET to aid in the management of its drug synthesis program. Results of biological evaluations of hundreds of new compounds each year are entered into the system, analyzed, and stored in such a manner as to facilitate comparison of new data with old.

A rather simple but elegant routine for keeping track of the numerous analogs of the peptide hormone, LHRH, has also been devised and enables the Branch, when a new analog is proposed by a contractor, to quickly check if the compound has already been synthesized. This system makes use of an alphanumeric representation of the peptide. A similar approach is now being developed for steroids in order to reduce the time required for substructure searches.

BMDP Biostatistical Computer Programs

The BMDP set of statistical computer programs, supported by the BRP under contract with the Department of Biomathematics, U.C.L.A., continues to serve a broader audience with new and improved programs.

The new programs for 1979 include stepwise logistic regression, K-means cluster analysis and balanced mixed model analysis of variance. All programs are now served by a new, more powerful transformation processor. Programs under development include spectral analysis and Box-Jenkins time series analysis, Cox models for survival analysis and multivariate general linear model analysis. Development of these programs has been guided by consultants from other institutions including Dr. John Tukey of Princeton University, Dr. George Tiao of University of Wisconsin at Madison, and Dr. G. W. Stewart of University of Maryland.

During the past year the 1979 edition of the BMDP Manual and many supporting technical reports were issued. A BMDP Digest and Pocket Guide will be issued shortly. Newsletters are issued approximately two times a year. In the last year, versions of BMDP were completed for the following computers: VAX, PDP-11, PDP-10, PDP-20, CDC, XEROX, UNIVAC 70, 90, and 1100, SIEMENS, HP-3000, Burroughs Large Systems and ICL 2000.

Short courses and seminars on BMDP programs were conducted in the United States, Canada and Western Europe. Additional tutorials are scheduled for the United States and Eastern and Western Europe in the late summer and early fall of 1979.

Guidelines for improved documentation and coding of BMDP programs are now being established. A preliminary set of these guidelines are being used at present. Input and encouragement from the BRP/BMDP advisory group has played an important role in the development of these guidelines.

A set of guidelines for enhanced communication between the BMDP group at U.C.L.A. and the statistical community were developed by the BRP/BMDP advisory group. These guidelines guarantee a wider participation in the selection and development of programs and features in future versions of BMDP.

Fiscal Year 1979
Annual Report
General Clinical Research Centers Program
Division of Research Resources

Background and History

The GCRC program was founded in 1959 through action of the Senate Appropriation Committee, which expresseed the belief that national clinical research resources were inadequate. The Committee recommended that Clinical Research Centers be established throughout the country to improve and intensify the scientific attack on man's diseases and their basic biologic parameters. Appropriations increased rapidly from 3 million dollars in fiscal 1960 to 33 million dollars by fiscal 1963. Program expansion was rapid and by 1966 93 centers had been established, with more than 1100 approved beds.

Following this rapid expansion a number of problems became apparent. Many centers could not fully occupy all of the beds which had been dedicated to clinical research. Questions were raised about the propriety of the Federal Government subsidizing the care of sick patients who are also research subjects. The need for research outpatient facilities as a complement to research inpatient facilities became increasingly apparent. At about the same time increased concern with the protection of human subjects began to surface. The complexity and paper work of doing clinical research projects intensified. Peer review procedures began to identify the centers whose clinical research activities were of marginal scientific merit.

In 1969 and 1970 a number of programmatic changes were implemented to correct these deficiencies and improve the overall scientific performance of the program. In 1969 the service patient policy was implemented. This policy had two objectives. The first was to require that the third party carriers reimburse the Centers for those patients who were sick enough to require hospitalization (B patients), while preserving the principle that NIH would continue to pay all costs for those patients hospitalized primarily for research. The second objective of the policy was to reduce the cost of temporarily unoccupied research beds by allowing hospitals to utilize some of them for non-research patients (C patients). The policy was written in such a way as to insure that the use of the centers for C patients did not disrupt the research activity by requiring a disproportionate share of the NIH research resources, nurses and dietitians. At first the service patient policy was accepted reluctantly, but now it is fully accepted and implemented throughout the program.

In 1978 the B patient program recorded 55,000 B patient days, which relieved the program of an estimated 8 million dollars in cost. C patients generated an additional 2 million dollars in revenues to help offset the costs of running the centers. There have been continued concerns that inappropriate application of the service patient policy might force investigators to do clinical research only on sick patients during periods of fiscal constraint. This would be detrimental to fundamental clinical

research efforts aimed at basic understanding of pathophysiology. Thus, the program has remained adamant in its position that scientific merit of the research protocol is the only acceptable criterion for prioritizing patient admission to the centers. Availability of third party payments may not be considered as a criterion for admission.

The use of B patients to help offset the cost of running the program showed a steady increase from 1970 to 1977 (Table 1), but showed no increase between 1977 and 1978, and it is unlikely to increase much in the future. Most likely no increase in the financial relief can be obtained from B patients revenues without altering the criteria for admission to the centers.

A second major change instituted in the program in 1970 was the provision of outpatient research facilities within the existing centers. Unused bed space was converted to examining rooms and existing personnel on the centers were retrained to provide logistical, nursing, and dietary support for outpatient research studies. The outpatient program proved successful, as well as highly productive. Moreover, it effectively utilized space and personnel resources already present. This aspect of the program has shown a steady growth, from 1,200 outpatient visits in 1970 to 76,000 outpatient visits in 1979. The outpatient research element of the program contributed to 1200 publications and 721 abstracts in 1977 alone.

A third major change in the program was the implementation of the mixed center concept, a derivative of the service patient policy. This concept was developed to counter the relatively high per patient cost of maintaining a discrete area with only a few beds. In some instances we have found that the bed base can be enlarged by admitting selected non-research patients with relatively undemanding requirements for care. Mixed centers require much cooperation between the program and the host hospital, but they have made clinical research units possible in institutions where a fully dedicated clinical research center is not cost-effective.

During the 1970s, application of these policies together with intensified scientific peer review has resulted in a program substantially different and improved from its counter part of 10 years ago. In 1969 there were 92 centers with 1016 beds, with a mean priority score of 251. Since 1969, 32 of these centers with 269 beds, at a mean priority of 310, have been terminated. The remaining 60 centers funded in 1969 with 757 beds have been reduced to 523 beds. The space for the 234 beds eliminated from these 60 centers has been converted to outpatient space, revenue producing C patient space, and storage. The outpatient space, including treatment rooms, waiting rooms, examining rooms, and offices, was staffed by existing center personnel. The 20,000 C patient days per year generate about two million dollars in revenue, helping to offset the personnel cost of operating the centers. It has been contemplated that the remaining storage space could be used for CLINFO and data management support staff for the centers. However, this has been possible in only a few instances. During the ten year period since 1969, 12 new centers, with 82 beds, have been

TABLE 1

PATIENT DAYS, OUTPATIENT VISITS AND ESTIMATED SAVINGS FROM B AND C PATIENTS

FY	A Patient Days	B Patient Days	C Patient Days	Total Days	Outpatient Visits	Estimated Savings 4/
70	199,911	25,577	19,336	244,824	1,175	$ 1,596,769
71	194,162	22,293	18,415	234,870	14,515	2,410,559
72	198,810	22,832	16,510	238,152	23,654	2,969,756
73	184,711	22,373	20,417	227,501	36,280	3,065,532
74	180,778	27,485	24,271	232,534	50,614	3,745,804
75	165,513	35,475	22,281	223,269	50,020	4,699,883
76*(12 mo.)	146,418	49,700	26,370	222,488	56,217	7,724,981
77	127,936	54,856	22,075	204,369	65,130	8,437,488
78	116,116 1/	55,362 1/	21,673 1/	193,151 1/	70,588 2/	9,773,615
79	114,668 3/	57,312 3/	26,352 3/	198,311 3/	76,042 3/	10,000,000E

1/ actual as of June 30, 1979
2/ actual as of November 30, 1979
3/ actual through June 30, 1979
4/ includes estimated savings for B patient ancillaries

* 14 months - A - 170,870 B - 58,003 C - 30,775

added to the program, with an average priority score of 207. Five of the 32 centers which were terminated have reapplied and successfully competed for 27 beds.

In summary, then, in 1969 the program supported 92 centers with 1016 beds with an average priority score of 251, while in 1979 it supports 75 centers, with 613 research beds and 76,000 outpatient visits, with an average priority of 213.

Program Content and Quality

The program supports 80 percent of the research inpatient care for the NIH categorical Institutes. More than 3,000 projects are conducted on the centers each year by an even number of investigators, most of whom receive support from research grants, training grants, program project grants, NIH contracts, or career development awards. Thus except for the larger clinical trials the program content is reflective of the NIH clinical research program as a whole. More specifically, in 1975 investigators using the centers were supported by 1907 NIH grants and contracts totalling 204 million dollars (Table II). A similar analysis of 20 centers in 1977 showed a similar pattern of support; by extrapolation, we estimate that in 1977 investigators using 82 centers were recipients of 246 million dollars in NIH grants and 35 million dollars in support from other DHEW agencies, research foundations and societies, industry, and other sources.

Another way of looking at program content is by broad disciplinary categories (trans-NIH activities). In 1977 the centers reported 433 projects costing $10,150,000 in nutrition; 578 projects, costing $7,242,000 in genetics; 330 projects, costing $5,962,000 in diabetes; and 91 projects costing $1,540,000 in arthritis. Of course, these categories (e.g., nutrition and diabetes) are not mutually exclusive, but they do give some idea of program support in a few research areas of great public interest.

Measures of program quality are somewhat more difficult to make, since one is always confronted with the question, "Compared to what?". In terms of publications, the program has had a more than 50 percent increase in output since 1970 (Table III). Moreover, there has been a steady increase in publications resulting from outpatient studies. Thus, the program seems to be far more productive than it was ten years ago despite the substantial decrease in the number and size of centers supported.

A recently completed priority score study provides some information on the level of quality. At the site visits, investigators using the center are ranked on a scale from 100 to 500, like that used by the NIH study sections, by site visit teams which are composed of national experts in the fields being reviewed and which are comparable to the NIH study sections.

In this study, the priority scores awarded to individual investigators at site visits in 1976 were compared with their utilization of bed-days and outpatient resources in 1977. In 14 consecutively reviewed centers, 82% of the patient days were utilized by investigators whose work had been

TABLE II

Estimated Non-GCRC Support for Investigators Using GCRCs by Institute FY 75

Institute	Number of NIH Grants and Contracts Awarded to Investigators Using GCRCs	Awarded Dollars (Millions)
National Institute of Allergy and Infectious Diseases	134	0.8
National Institute of Arthritis, Metabolism and Digestive Diseases	659	40.2
National Cancer Institute	290	45.3
National Institute of General Medical Sciences	112	16.8
National Institute of Child Health and Human Development	187	15.6
National Heart, Lung and Blood Institute	377	70.6
National Institute of Neurological and Communicative Disorders and Stroke	50	7.4
National Institute of Mental Health	38	2.4
National Eye Institute	29	2.2
National Institute of Dental Research	12	0.6
National Institute of Aging	8	0.8
Other	11	1.6
Total	1907	204.3

TABLE III

CENTER PUBLICATIONS

Year	Publications	(Publications Involving Outpatients)	Abstracts	(Abstracts Involving Outpatients)
1969	2,077		931	
1970	2,341		966	
1971	2,219	(246)	991	(122)
1972	2,462	(411)	994	(168)
1973	2,360	(549)	1,176	(285)
1974	2,789	(786)	1,458	(402)
1975	2,993	(935)	1.510	(496)
1976	3,348	(1,120)	1,626	(661)
1977	3,282	(1,228)	1,752	(721)
1978	3435	(1,130)	1,962	(743)

assigned priority scores at the DRR site visit; 18 percent of the bed-day utilization was for new investigators. Of the usage for investigators assigned a priority score by DRR reviewers, about 61% was by those who received a priority score between 100 and 200 at the site visit, and 31 percent was by investigators who had received a priority between 201 and 250. Only 8 percent of the patient day usage was by investigators who received a priority of 260 or higher. The 92% of reviewed investigators whose scores were 250 or better is very similar to the 95% recorded for funded R01 research grants in fiscal 1976. Considering the difficulties involved in doing clinical research, and the importance of clinical trials, which generally receive lower priority scores for scientific novelty, this comparison shows that the work done on GCRCs is similar in scientific quality to that in the research grants program. A previous study established that DRR site visitors award essentially the same average priority score (197) for protocols presented by grant and supported GCRC users as the DRG study section members do for these investigators' research grants in the same scientific areas. The data from these sampling studies indicate that the quality of the work performed on the GCRCs is being effectively maintained by the institutional and national review systems.

Budgetary History

Attached (Table IV) is a ten-year budgetary history of the program, showing the number of beds, number of centers, the appropriation, and the number of personnel supported. The inflationary factors in the program have been somewhat greater than those in the general economy during the past ten years. For expample, the cost of personnel has increased at an annual rate of 9 percent per year for the past ten years, and is expected to continue at this rate at least through next year. The cost per position per year is shown in Table V.

Hospitalization costs have increased at an even more rapid rate, averaging over 13 percent. Between 1972 and 1977 these cost increases were somewhat ameliorated by recoveries from the service patient policy, but current analyses indicate that additional revenue from this source cannot be expected without substantially altering the program content and sacrificing program quality.

TABLE IV

GCRC PROGRAM, 1969 - 1979

FY	CENTERS	POSITIONS FTE	FUNDED BEDS	PATIENT DAYS A + B + C	APPORTIONMENT (in thousands)
69	93	2,298	1023	245,943	$ 35,004
70	93	2,076	904	244,824	35,004
71	82	1,885	881	234,870	38,004
72	84	1,867	907	238,152	42,181
73	83	1,790	893	227,501	41,300
74	87	1,795	877	232,534	42,320
75	84	1,732	823	223,269	42,619
76	84	1,727	784	222,488 1/	42,533
77	82	1,679	755	204,369	47,283
78	79	1,706	633 3/	193,151 2/	51,946
79	74	1,622	613 3/	198,000	51,941
80	75	--	600 4/	--	56,720 4/

1/ 12 month period
2/ actual as of June 30, 1979
3/ excludes 73 beds used for C patients included prior to 1977
4/ estimate

TABLE V

GCRC COST DATA

FY	CENTERS	POSITIONS FTE	COST/POSITION/YEAR	% INCREASE
69	93	2,298	$ 8,334	
70	93	2,076	9,244	10.9
71	82	1,885	10,228	10.6
72	84	1,867	10,228	7.4
73	83	1,790	11,746	6.9
74	87	1,795	12,785	8.8
75	84	1,732	13,750	7.5
76	84	1,727	15,021	9.2
77	82	1,679	16,551	10.2
78	79	1,706	17,852	7.9
79	74	1,622	19,427	8.8
80 1/	75	---	---	---

1/ estimate

Research Accomplishments

Hypertension (I)

A kidney prostaglandin, prostacyclin, has been found to directly affect blood pressure, and may be an important factor in hypertension. It acts by regulating the secretion of renin, a kidney hormone that increases blood pressure. This raises the possibility that specific drugs which inhibit prostacyclin formation might represent new ways of controlling hypertension.

Hypertension (II)

A novel experimental anti-hypertension drug, Captopril, acts by blocking formation of the potent blood pressure-raising hormone angiotensin II, Captopril can lower blood pressure in many patients with either renovascular hypertension, hypertension due to renal failure, or essential hypertension resistant to multiple combinations of other drugs.

It has also been found that the action of Captopril is dramatically potentiated by addition of diuretics, because it blocks activation of the renin system, which is one of the ways in which the body normally resists the action of diuretics. Captopril itself is a mild stimulus to sodium excretion, at the same time that it helps the body conserve potassium. This is because Captopril reduces the secretion of aldosterone, the most potent salt-retaining hormone of the adrenal gland.

In summary, these studies have outlined the mechanisms of action and demonstrated the safety and efficiency of a new drug of great practical value to practicing physicians and the large hypertensive population.

Prenatal diagnosis of thalassemia

A new technique which identifies hemoglobin genes in fetal cells taken from amniotic fluid can be used to detect different forms of thalassemia, a debilitating blood disease which occurs predominately in Mediterranean peoples. The method may also be applicable to prenatal diagnosis of conditions such as immunoglobulin diseases, sickle cell anemia, hemophilia, or other genetic conditions.

Artificial fat

An artificial fat, sucrose polyester, appears to be a safe, effective, non-caloric, well-tolerated cholesterol-lowering agent. It works in high or low cholesterol diets, and does not change the consistency of food containing it.

Ventricular tachycardia

Computerized methods have been developed to make a classification of ventricular tachycardias, or excessively rapid heart action. Specific drugs have been tested and found effective for some of these conditions.

Lyme arthritis

A new tick-borne srthritis has been discovered. It is similar to rheumatoid arthritis but has a characteristic skin lesion and includes neurologic involvement in the early stages. Studies are underway to determine the etiologic agent carried by the tick, possibly a virus. The ticks involved feed on a variety of animals, but the presence of household pets, particularly cats, increases the risk of exposure.

Connective tissue diseases

Patients with any one of a number of rheumatologic conditions are benefitting from new diagnostic tests. The new tests are important primarily in identifying patients who have mixed connective tissue disease, a relatively benign and manageable condition, rather than the more serious disseminated lupus erythematosus, which requires intensive therapy.

Diaphragmatic pacemaker

Patients with the primary hypoventilation syndrome, or "Ondine's Curse" are subject to respiratory arrest during sleep. Now a new instrument, adapted from the cardiac pacemaker, artificially stimulates the phrenic nerve and maintains respiration. This miniaturized device frees quadriplegics and patients with Ondine's Curse from mechanical aids such as iron lungs, rocking beds, tank respirators, and endotracheal breathing devices.

Carcinogen-producing enzymes in the skin

Coal tar products, which are used extensively in treating dermatologic conditions, contain numerous polycyclic aromatic hydrocarbons, including the notorious chemical carcinogen benzo(a)pyrene (BP). New studies show that topical coal tar, and particularly its BP constituents, markedly increase the activity of skin aryl hydrocarbon hydroxylase, an enzyme which plays an important role in the activation of polycyclic hydrocarbons into reactive moieties which can bind to DNA and which may directly induce cancer. These studies suggest that the application of coal tar solution in doses ordinarily used in treating skin disease could induce carcinogenic responses in skin, or, after percutaneous absorption, in other tissues as well.

Insulin delivery systems

A wearable mechanical pump, no larger than a paperback book, can inject insulin under the skin of a diabetic person slowly enough to mimic the output of a normal pancreas. A patient-activated switch delivers a pre-programmed increased dose before meals. With this pump, fluctuations in blood sugar are considerably less than when insulin is administered by the usual method of one or two manual insulin injections per day. It is believed that this more precise control of blood sugar levels will be a means of preventing or delaying the onset of the complications of diabetes. The pump has been successfully tested over periods of up to two weeks in ambulatory patients; more sophisticated versions would be completely implantable and remotely controlled by the patient, with no wires or tubes breaking the skin. These later versions may also involve glucose sensors for automatic feedback control of the blood sugar.

Sickle Cell trait

Growth and development has been shown to be normal in asymptomatic carriers of the sickle cell gene. A new study avoided the methodologic flaws of previous studies which reported impaired physical growth and cognitive development in these individuals, and removes the stigmata attached to this clinically benign trait. Only when two genes for sickle cell hemoglobin are present in the same individual, and frank sickle cell disease develops, is growth affected.

Heart transplantation

The five-year survival rate of cardiac transplant patients operated on since 1973 is projected at 50 percent. This compares favorably to graft survival rates for recipients of renal grafts from unrelated donors. Restoration of physical and psychosocial function has been highly gratifying in 91 percent of 74 patients who lived one year or more after the transplant.

"Accelerated graft arteriosclerosis" is a late complication of cardiac transplantation which sometimes requires a second transplant. Risk factors which have been identified for this condition include donor age greater than 35 and mismatching at the HLA-A locus, especially for A2 and A3. Knowledge of these risk factors can be used to decrease the frequency of the complication.

Pesticide toxicity

It was previously found that elimination of Kepone from the body is speeded by administration of a resin called cholestyramine. Of new interest is a finding that excretion of Kepone either naturally or as stimulated by cholestyramine will ameliorate the signs and symptoms of its toxicity. Possibly of even more importance is a demonstration that the cholestyramine method is also effective in stimulating the removal of chordane, another, more widely used toxic pesticide. The resin may be of general use as a detoxifying agent for materials taken up by the liver.

Program Progress

The Program continues to receive applications for both inpatient and outpatient resources from institutions without General Clinical Research Centers. Three institutions are in the process of preparing inpatient applications. One dental outpatient center has been approved for funding, and additional insitutions have inquired about the establishment of General Clinical Research Centers. Approved new applications will compete with continuation applications for funding, to the limits of available appropriations.

The Program continues its interest in clinical research manpower development. The Clinical Associate Physician (CAP) Program, a post fellowship program intended to develop clinical investigators, now in its sixth year, has attracted condidates of high quality. There are currently 30 CAP positions. Of the 31 CAPs who have completed the program, 27 are continuing academic careers, while four have gone into private practice.

CLINFO

The CLINFO system, a computer based data management system designed for clinical research applications, has been widely accepted by the clinical investigator community and a diffusion program is underway. Bolt, Beranek and Newman has been competitively selected as the purveyor for the system, and CLINFO awards have been made to Duke and Johns Hopkins Universities. The Program currently has 12 additional approved applications awaiting funding.

Core Laboratories

Core Laboratories have undergone intensive review during the last four years with a reduction in the average number of technical positions funded. Program plans call for wider application of newer technology, such as CLINFO, Gas Chromatography-Mass Spectrometry, and high pressure liquid chromatography as core laboratory functions.

Clinical Trials

The Program is currently studying a two-year study by the Rand Corporation entitled "The Evaluation of the Role of Clinical Trials, with Emphasis on Information Processing". The goals of this contract are to 1) determine how clinical trials of different sizes differ in methodology, computer requirements, and need for support personnel; 2) determine how clinical trials are designed and controlled; 3) evaluate the extent of collaboration, the difficulties (e.g., allowing the investigators access to the compiled data base), and how these will impact on the clinical trials performed in CRCs; 4) characterize data management systems used in clinical trials at present, determine what problems were encountered in establishing such systems, and recommend how computer-based data-systems can improve the format of a trial; 5) determine the role of specific aids in administering clinical trials (e.g., keeping records, generating reports, admitting patients).

Administrative Coordinators

Administrative Coordinators have worked closely with Grants Management staff to sponsor orientation sessions for new Administrative Coordinators, and are currently working with Program and Grants Management staff to develop an agenda for their biennial meeting.

Nurses and Dietitians

The nurses and dietitians are an important component of the personnel resource supported by the GCRC Program. These professionals, aware of the critical nature of their contribution to the clinical research process, have organized the National Association of Research Nurses and Dietitians. The Program proposed to investigate the potential value of a workshop at which the unique characteristics of research nursing and dietetics would be discussed, and organized in a meaningful manner to benefit the GCRC Program.

Fiscal Year 1979
Annual Report
Biomedical Research Support Program
Division of Research Resources

The Biomedical Research Support Program administers two institutional research grant programs, the Biomedical Research Support Grant (BRSG) Program and the Biomedical Research Development Grant (BRDG) Program.

BIOMEDICAL RESEARCH SUPPORT GRANT PROGRAM

BRSG awards are made to institutions that receive each year at least three allowable Public Health Service (PHS) research grants totalling at least $200,000. The amount of each award is computed by a formula that is applied to the total dollar amount of allowable PHS research grants during the previous Federal fiscal year. BRSG funds are used for those direct costs of biomedical research that are not feasibly supported by other PHS research grants, or that are supported most efficiently and at least cost with BRSG funds. The objectives of the program are to enhance the quality of biomedical research, increase its productivity, and reduce its cost.

On January 22, 1979 President Carter submitted to the Congress his budget request for FY 1980 which included funds for the Biomedical Research Support Program. This is the second consecutive year that support for the program has been requested by the President.

A revised BRSG General Policy and Information Statement dated April 1, 1979 was issued with the 1979 BRSG awards.

On December 7, 1978, the Director, DRR, requested the Biomedical Research Support Subcommittee of the General Research Support Review Committee to develop long-range plan recommendations for the BRSG and BRDG Programs. The report, dated June 28, 1978, was developed through the efforts of a work group from the subcommittee, the full subcommittee, and the Biomedical Research Support Program Work Group of the National Advisory Research Resources Council (NARRC). The long-range plan recommendations were a source of advice in developing the BRS Program section of the DRR Five-Year Plan, 1982-1986. The Five-Year Plan will be presented to the Director of NIH after it has been discussed by the NARRC at its meeting of October 24-26.

Four regional meetings of program directors with BRS Program staff were held during the year; in Shrewsbury, Massachusetts for institutions in Massachusetts and Rhode Island, San Francisco for institutions in northern California, Los Angeles for institutions in southern California, and Houston for institutions in Texas and Louisiana. This continues a practice that was begun in 1978 and will

continue in 1980. The regional meetings have resulted in better understanding of program objectives and policies by grantees and better management of awards by grantees and the DRR.

The following tables describe the utilization of BRSG funds, the amounts available, and their allocation to grantees.

TABLE I

BRSG Expenditures by Activity FY 1977

	Number	Dollars (in thousands)	% of Total Dollars
RESEARCH PROJECTS	9,565		
Pilot Projects	5,098	13,503	30.8
Regular Projects	4,467	16,882	38.5
CENTRAL RESOURCES		10,897	24.8
OTHER ACTIVITIES		2,608	5.9
TOTAL		43,890	100.0

TABLE II

FUNDING HISTORY
Biomedical Research Support (BRS) Program
(Dollars in thousands)

Year	A Funds Available for NIH Research Grants 1/	B BRS Authorization Ceiling (15% of Funds Available for NIH Research Grants)	C BRS Appropriation	D Column C as a Percent of Column A
1966	$ 604,377	$ 90,657	$ 45,200	7.5
1967	681,197	102,180	51,700	7.6
1968	727,366	109,105	59,700	8.2
1969	729,230	109,385	60,700	8.3
1970	744,061	111,609	57,677	7.8
1971	765,510	114,827	54,200	7.1
1972	901,119	135,168	55,212	6.1
1973	925,457 1/	138,818	60,700 2/	6.5
1974	997,878	149,681	45,149 3/	4.5
1975	1,142,783	171,417	42,957	3.7
1976	1,272,771	184,465	42,957	3.5
1977	1,419,821	212,973	40,873 4/	2.9
1978	1,610,036	241,505	40,873 4/	2.5
1979	1,868,551	280,282	45,021 4/	2.4

1/ Thru 1972 includes NIMH

2/ Includes 33.5 million impounded funds

3/ Excludes Minority Biomedical Support Program funds after 1973

4/ Includes Biomedical Research Development Grant Funds

TABLE III

Distribution of BRSG Awards by Size

Size of BRSG Award (in thousands)	Number of Grantee Institutions			
	FY 1976	FY 1977	FY 1978	FY 1979
Under - $ 30.0	74	94	93	78
$ 30 - 49.9	87	89	89	93
50 - 99.9	116	115	106	105
100 - 149.9	60	69	79	82
150 - 199.9	48	37	30	41
200 - 249.9	19	51	48	58
250 - 299.9	37	--	--	--
TOTAL	441	455	445	457

Grant Range	Amount			
	FY 1976	FY 1977	FY 1978	FY 1979
Low	$ 17,418	15,565	14,198	14,441
High	261,305	213,709	200,462	201,413
Average	96,955	86,754	86,117	91,359

TABLE IV

Total Entitlement* Compared to BRSG Funds Awarded

Fiscal Year	Entitlement*	BRSG Funds Awarded	Ratio BRSG/Entitlement
1976	$ 995,465,535	$42,957,000	4.32%
1977	1,060,171,080	39,473,000 1/	3.72
1978	1,153,259,633	38,322,272 1/	3.32
1979	1,324,013,741	41,751,118 1/	3.15

*Total allowable PHS grants used for computation of BRSG awards

1/ Excludes Biomedical Research Development funds

TABLE V

Distribution of BRSG Awards by Type of Institution

Type of Grantee Institution	FY 1973	FY 1974	FY 1975	FY 1976	FY 1977	FY 1978	FY 1979
Medicine	104	104	107	106	107	109	109
Dentistry	34	33	34	26	27	31	29
Osteopathy	0	0	1	1	1	1	1
Pub. Health	12	12	12	12	13	13	12
Pharmacy	14	12	17	13	14	12	13
Veterinary Med.	15	14	15	10	11	10	10
Nursing	3	4	5	3	2	4	5
Allied Health	1	1	1	0	0	0	0
Optometry	0	0	0	0	0	0	1
Hospitals	71	66	71	63	61	59	61
Health Dept.	2	2	2	2	1	1	2
Research Inst.	71	70	75	71	71	67	67
Other Academic 1/	113	108	121	134	147	138	147
TOTAL	440	426	461	441	455	445	457

1/ Academic institutions other than health professional schools

BRSG awards are used for a wide variety of purposes, some of which are illustrated by the following examples.

BRSG funds provided supplemental support to Dr. Neil G. Ingels of the Palo Alto Medical Research Foundation, for supplies, instrumentation, and partial salary support in the development of a technique to measure cardiac function by x-ray motion picture studies of movements of tantalum coil markers placed in heart muscle at the time of surgery. This technique, which does not have the drawbacks and risks of other techniques, provides important information on the success of various types of heart surgery, and the response of the heart to exercise, drugs, Valsalva manuever, etc.

An investigator at the University of California at Los Angeles School of Dentistry, developed with BRSG support a tissue culture model of osteogenesis. The model replicates development of woven and lamellar bone. It has been used in studies of bone physiology and pathology, including virus induced osteosarcoma, a malignant tumor of bone. Studies using this model are being supported by research project grants, and findings from such studies, following peer-review of their validity, have been published in scientific journals.

BIOMEDICAL RESEARCH DEVELOPMENT GRANT PROGRAM

The BRDG Program is a competitive institutional grant program intended for institutions that have limited health research capability, have significant health manpower training responsibility, are committed to improving and sustaining their health-related research, and offer strong potential for high quality health-related research. The objective is to strengthen and/or expand health-related research in eligible institutions provided it will result in improving the training of manpower for clinical health professions or health-related research or both.

Nine new BRDG awards were made in 1979, bringing the total number of awards to 32. The new and continuation 1979 awards total $3,133,229. The numbers awarded to each type of institution are:

TABLE VI
BRDG AWARDS AS OF 9/30/79

School of Medicine	8
School of Dentistry	3
School of Osteopathy	3
School of Pharmacy	6
School of Veterinary Medicine	3
School of Nursing	1
Other Academic	3
Hospital	2
Research Organization	3
	32

During the course of the three completed review cycles, 174 applications have been reviewed. As a result of reapplication by previously unsuccessful applicants, there have been 137 different institutions that have applied.

Some accomplishments of the BRDG Program are illustrated by the following examples.

BRDG funds were used at one institution for recruitment of investigators, release time for research by existing staff, and purchase of research equipment. During the first year of BRDG support, 18 projects were initiated and during the second year, an additional seven projects. Two of the projects are now supported by research project grants, and three other project grant applications are pending review.

At a new medical school, the BRDG award assisted in the attraction of research oriented faculty. The BRDG support enabled the institution to increase the number recruited to 32, and to provide them with initial research support immediately upon entering on duty.

TABLE VII

NUMBER OF INSTITUTIONS
WHICH APPLIED FOR
BRDG PROGRAM 1/

	Fiscal Year '77	'78	'79	Total Institutions	Total Funded
Allied Health	0	1	2	3	0
Dentistry	14	7	3	24	3
Hospitals	5	5	1	11	2
Medicine	14	2	2	18	8
Nursing	1	9	2	12	1
Optometry	0	0	2	2	0
Osteopathy	4	2	1	7	3
Other Academic	8	5	0	13	3
Pharmacy	10	2	4	16	6
Podiatry	0	0	1	1	0
Public Health	2	0	2	4	0
Research Institutes	10	4	3	17	3
Veterinary Medicine	4	4	1	9	3
Total New Applicants	72	41	24	137	32

1/ No Resubmissions Included

TABLE VIII

BRDG PROGRAM
APPROVAL AND FUNDING RATES

FY	Number of Applications	Approval Rate (Percent)	Funding Rate (Percent)
'77	72	31.9	16.6
'78	58	32.7	18.9
New App.	41	19.5	14.6
Resubmission	17	64.7	29.4
'79	44	34.1	20.5
New App.	24	20.8	12.5
Resubmission	20	50.0	30.0

The BRDG General Policy and Information Statement and the Instructions for Preparation of Application have been revised. Both of these documents are dated July 1, 1979.

The NIH Guide for Grants and Contracts, Vol. 8, No. 9, July 6, 1979 announced the October 1, 1979 deadline for receipt of BRDG applications and the intent to accept no applications in 1980 or thereafter. The decision to phase-out the program after the next review was based upon the declining number of applications and the even greater decline in the number of institutions that submit applications for the first time. Funds that will no longer be needed for BRDG awards will be restored to the BRSG Program and/or for new types of research grant support that might be initiated under the general research support authority of the Public Health Service Act, Section 301 (a)(3).

FISCAL YEAR 1979
ANNUAL REPORT
MINORITY BIOMEDICAL SUPPORT PROGRAM
DIVISION OF RESEARCH RESOURCES

GENERAL RESPONSIBILITY

The Minority Biomedical Support (MBS) Program is charged with the responsibility of trying to rectify the problem of the underrepresentation of ethnic minorities in biomedical sciences. Resolution of this problem is approached through the granting of institutional awards focused on providing minorities equality of opportunity to engage in biomedical research. The MBS Program supports projects designed to strengthen biomedical research capabilities of institutions with a significant commitment to minorities, and to increase and expand the involvement of faculty and students in biomedical research.

SPECIFIC OBJECTIVES

The overall mission of the MBS Program is necessary as a result of the dearth of minority scientists. Therefore, the specific objectives of the Program are:

a. to increase the numbers and quality of minority biomedical scientists,
b. to strengthen and develop the research setting (eligible institution) in which biomedical research can be conducted, and
c. to broaden the opportunities for involvement in biomedical research by ethnic minority faculty, students and investigators.

The MBS Program provides funds for released time so that faculty may have the opportunity to conduct biomedically oriented research. Equipment, supplies and necessary renovations for approved research projects are supported by this Program. In addition, funds are provided for student participation in research as well as for consortia, collaborative arrangements, special summer projects, and travel to scientific meetings.

In June 1974, the Director of the National Institutes of Health requested that all Bureaus, Institutes and Divisions initiate and coordinate their minority programs activities through the existing minority programs (i.e., the Minority Biomedical Support Program (MBS),DRR and the Minority Access to Research Careers Program (MARC),NIGMS). It was through this request that the Intra-Agency agreements between the Institutes and the MBS Program were forged.

The initial review of all applications is conducted by the General Research Support Committee and the secondary review is provided by the National Advisory Research Resources Council in cooperation with the National Advisory Council of the Bureau or Institute entering into the agreement. Following the review, the cooperating Institute or Bureau provides support of those components of grants that are congruent with their research thrust.

The purpose of the Intra-Agency Agreements are to place Minority Biomedical Support (MBS) Program investigators in a position to enter the research arena of the cooperating Institute. Via the cooperating agreement, investigators are made more aware of the Institute's research thrust and application requirements and this can place them in a competitive position for research support.

At present the following Institutes have developed Intra-Agency agreements with the MBS Program:

1. The National Cancer Institute
2. The National Heart, Lung and Blood Institute
3. The National Institute on Allergy and Infectious Diseases
4. The National Institute on Aging
5. The National Institute of Dental Research
6. The National Institute of Child Health and Human Development
7. The National Institute of Neurological and Communicative Disorders and Stroke
8. The National Eye Institute
9. The National Institute of Arthritis, Metabolism and Digestive Diseases
10. The National Institute of Mental Health

The Agreements with the National Eye Institute, the National Institute of Arthritis, Metabolism and Digestive Diseases and the National Institute of Mental Health were negotiated during FY 1979.

The Intra-Agency agreements have resulted in the accomplishments presented in Tables 1 and 2. As evident from the Tables, reimbursements have increased from $341,964 in fiscal year 1975 to $4,564,000 in fiscal year 1979. The number of projects supported have increased from 8 in FY1975 to 114 in FY1979.

PROGRAM HIGHLIGHTS

One of the major Program highlights this year was the Annual MBS Symposium held in Atlanta, Georgia, on April 15-18, 1979. About 1500 individuals attended the meeting with the largest percentage being students and investigators. Over 400 scientific research papers were presented. Most of them were presented by MBS student research participants. This year 2 new facets were added; scientific techniques workshops and poster sessions. The poster session was well attended and there were over 100 poster presentations. Several students and investigators participated in the workshops that offerred techniques in: Recombinant DNA, Immunology and Disease, Techniques in Isoelectric Focusing-Polyacrylamide Gel, Radioimmunoassay, Liquid Chromatography, Liquid Scintillation Counting, Cell Culture and Computer Graphics.

Several invited papers were presented by well known minority and non-minority scientists including two Nobel Laureates, Dr. Howard Temin and Dr. Charles Huggins. A number of institutions sent represenatives to the symposium to provide information and recruit minority students into

their graduate and professional programs. In addition, several representatives from NIH were present to provide investigators with information regarding their programs and explain application procedures. The abstracts of papers presented were published in a 179 page journal. Copies of the program and published abstracts are available in the DRR files.

This year at the Annual Program Directors Meeting in Houston, Texas, cost sharing and indirect costs were discussed. This is the first year that the MBS Program is authorized to pay indirect costs. A major emphasis was on the establishment of a work session in which the new MBS Policy and Information statement was developed. In addition, cooperating Institutes sent representatives to the meeting. The major objective of this activity was to have Program Directors present pre-proposals to the proper Institute representative for a critique. This interaction motivates investigators to seek funding through non-MBS channels and the critique provided the investigators with feedback that would improve their grantsmanship relative to the Institute's thrust. The Program Directors Meeting was considered very successful by all concerned.

STAFF VISITS

This year a major emphasis was placed on conducting administrative staff visits to Grantee institutions. MBS Staff conducted 40 staff visits in the past year. The major objectives of the staff visits were to monitor the projects, and assist the Program Director in managing the grant and develop the strongest program possible. Also, the staff visit provided information that was very useful in the making of decisions to determine the level of funding for continuations and renewals. This allowed the staff to phase out some weak projects and start up some new projects.

NEW INITIATIVES

Two-year colleges became eligible to submit applications under new guidelines developed by staff and the advisory groups. Several applications have already been received and two were funded this year.

PROPHET - A new activity was also made possible through an agreement with the Biotechnology program for making the PROPHET computer system available to MBS investigators. At least one PROPHET user site per year will be established at MBS institutions. Workshops and demonstrations will be conducted this fall.

Five Year Plan - Work was begun on development of a five year plan. This involved several meetings of a subcommittee of the General Research Support Review Committee to develop a position paper to assist the DRR in writing the five year plan.

Data Base Management - In order to plan for an evaluation of the program, an effort was initiated to develop a computerized system of data capture for scientific and fiscal data. Accessibility to program and grants management staff is made possible by the use of a CRT terminal in the branch.

ACCOMPLISHMENTS

Several of our MBS students have provided evidence that the Program is reaching fruition. To date, 30 Ph.D. students have graduated and are now doing postdoctoral work at major laboratories. It is not known how many of the 1800 or so MBS graduates since 1973 are still pursuing graduate or professional degrees. Part of the planned evaluation effort will center on tracking MBS graduates.

Faculty investigators are entering the competitive arena at NIH by the regular research grant application route and also by appointments to NIH review and advisory groups. Several MBS investigators were appointed to review committes and one was appointed to the Recombinant DNA advisory committee. There is anecdotal evidence that investigators are gaining recognition.

According to the most recent data available, the MBS Program has achieved the following:

1. There were 315 publications, 320 faculty presentations and 467 student presentations reported in progress reports for FY1978. The results for FY1979 are not complete yet.
2. Career choices of MBS graduates in FY 1978: 147 entered medical school, 24 entered dental school, 113 entered graduate school, and 74 entered other health-related schools.
3. Intra-agency agreements increased substantially; the numbers of projects funded by Institutes increased to 114 for 1979 with 10 Institutes participating.
4. In 1978 the number of positions funded in the MBS Program were 389 faculty, 786 undergraduate students, and 245 graduate students. The Participants are involved in over 400 separate research projects funded by the Program at 80 institutions. In FY 1979 the comparable figures are: 402 faculty; 739 undergraduates, 247 graduate students.

All of the above data indicates that there is a definite trend toward accomplishing the goals of the MBS Program, and one can project that this positive trend will continue.

Detailed information regarding this data is shown on the following tables.

TABLE II

MBS ACCOMPLISHMENTS

PUBLICATIONS AND PRESENTATIONS

1974-1979

	1974	1975	1976	1977	1978*	1979**
Publications	75	163	320	344	315	402
Presentations (faculty)	143	211	339	311	320	358
Presentations	212	398	520	488	467	439

*Data is incomplete for 1978
**Data is incomplete for 1979 (55 grantees reporting)

TABLE II

MBS ACCOMPLISHMENTS

CAREER CHOICES OF GRADUATES

1974-1979

	1974	1975	1976	1977	1978	1979*	Total 1974-1979
Medical School	78	116	150	166	142	147	799
Dental School	13	22	40	24	27	24	150
Graduate School	99	120	174	150	119	113	775
Other Health Related Schools	35	39	87	79	103	74	417
Total Enrolled in Advanced Training	225	297	451	419	391	358	2141
Total MBS Graduates	295	399	648	543	572	421	2878

* Data incomplete (only 55 reports available)

REIMBURSEMENTS - MBS (ACTUAL)

	FY 1975	FY 1976	FY 1976-TQ	FY 1977	FY 1978	FY 1979
Reimbursements:						
NCI	$ 228,268	$ 654,842	$ 131,380	$ 1,137,819	$ 1,465,866	$1,472,704
NHLBI	113,696	526,358	217,847	440,872	1,397,921 1/	1,587,081 2/
NIAID				112,252	114,047	125,858
NIAMD						319,944
NIDR				26,380	32,258	111,327
NIA				177,816	214,962	222,516
NEI						8,458
NICHD					261,853	418,126
NIMH						279,163
NINCDS						50,455
SUBTOTAL	$341,964	$1,181,200	$349,227	$1,895,139	$3,486,907	$4,595,632
MBS Appropriated Funds	7,270,000	7,610,000	1,238,000	9,711,000	10,758,000	14,574,000
TOTAL FOR MBS	$7,611,964	$8,791,200	$1,587,227	$11,606,139	$14,244,907	$19,169,632

*DLD	$ 302,821	$ 337,979
DBDR	52,223	84,225
DHVD	1,042,877	1,164,877
Total	1,397,921 1/	$1,587,081 2/

7/31/78

Table 1 (Con't)

YEAR	INSTITUTE	NUMBER OF PROJECTS	AMOUNT
FY-1978	National Institute of Child Health & Human Development (NICHD)	8	$ 271,991
FY-1979 (Estimated)	National Cancer Institute (NCI)	33	1,471,407
	National Heart, Lung and Blood (NHLBI)	38	1,659,745
	National Institute of Allergy and Infectious Disease (NIAID)	3	125,858
	National Institute of Arthritis Metabolism and Digestive Diseases (NIAMDD)	12	347,694
	National Institute of Dental Research (NIDR)	4	111,327
	National Institute on Aging (NIA)	5	221,705
	National Eye Institute (NEI)	1	8,458
	National Institute of Child Health & Human Development (NICHD)	10	291,950
	National Institute of Mental Health (NIMH)	5	276,106
	National Institute of Neurological Communicative Diseases and Stroke (NINCDS)	3	50,455
SUBTOTAL		114	4,564,705

SUMMARY OF MBS-NIH INSTITUTES
COOPERATIVE FUNDING AGREEMENT FY75-79

YEAR	INSTITUTE	NUMBER OF PROJECTS	AMOUNT
FY-1975	National Cancer Institute (NCI)	5	$ 228,268
	National Heart, Lung and Blood (NHLBI)	3	113,696
FY-1976	National Cancer Institute (NCI)	20	654,842
	National Heart, Lung and Blood (NHLBI)	25	526,358
FY-1976 TQ	National Cancer Institute (NCI)	4	131,380
	National Heart, Lung and Blood (NHLBI)	13	217,847
FY-1977	National Cancer Institute (NCI)	21	1,137,819
	National Heart, Lung and Blood (NHLBI)	11	440,872
	National Institute of Allergy and Infectious Disease (NIAID)	3	112,252
	National Institute of Dental Research (NIDR)	2	26,380
	National Institute on Aging (NIA)	4	177,816
FY-1978	National Cancer Institute (NCI)	33	1,467,410
	National Heart, Lung and Blood (NHLBI)	35	1,456,711
	National Institute of Dental Research (NIDR)	2	35,258
	National Institute on Aging	5	220,262

Library
National Institutes of Health
Bethesda, Maryland 20014

NIH LIBRARY
4 0131 9698

LIBRARY
NIH
Amazing Research.
Amazing Help.
http://nihlibrary.nih.gov
10 Center Drive
Bethesda, MD 20892-1150
301-496-1080

NIH LIBRARY
3 1496 00178 5073